Clinical Laboratory Science

Bachelor of Science

Pre-Medical Concentration (http://catalog.uis.edu/undergraduate-students/clas/clinicallabscience/premedical)
Medical Laboratory Technician (MLT) - Clinical Laboratory Science (CLS) Articulation (http://catalog.uis.edu/undergraduate-students/clas/clinicallabscience/mlt)

http://www.uis.edu/alliedhealth/
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Office Phone: (217) 206-6589
Office Location: HSB 314

CLS Goals and Objectives

A Bachelor of Science degree in Clinical Laboratory Science provides exciting opportunities for individuals with an interest in science who wish to pursue a career in a health/medical profession or other laboratory-related field. Medical laboratory scientists/medical technologists analyze blood and other body fluids using a variety of methods and sophisticated biomedical instruments. The results of these analyses are used to determine the presence or absence of disease, help determine appropriate medical treatment, monitor therapy, and assess health. Medical laboratory science encompasses such disciplines as hematology, clinical chemistry, immunohematology (blood banking), microbiology, immunology, and molecular diagnostics. Medical laboratory scientists are proficient at problem-solving, integration, organization, and quality management. In addition to performance and interpretation of laboratory procedures, clinical laboratory scientists may be involved in the selection of lab methods or analyzers, as well as training, supervision, and consultation with other health care professionals.

A CLS education provides an excellent preparation for medical and graduate schools, and also prepares one for employment opportunities outside the hospital setting. Recent graduates have gone on to medical school, law school, and programs in physical therapy, pathologists’ assistant, and public health. Diverse job opportunities include employment in research laboratories, forensic science laboratories, veterinary laboratories, fertility centers, and employment as laboratory computer specialists, educators, and laboratory consultants.

Clinical Laboratory Science Program goals are listed below. Learning outcomes/graduate competency statements are found on the Allied Health website in the CLS Student Handbook. Program outcomes are posted on the Allied Health website.

1. Prepare CLS students for entry-level employment as medical laboratory scientists. This is related to the UIS goal #1, Academic Excellence.
2. Prepare CLS students with a solid science foundation, medical, and laboratory knowledge to position them to deal with changes in the profession or changes in their career path. This is related to the UIS goal #1, Academic Excellence.
3. Provide graduates for the Illinois health care workforce, especially central Illinois. This is related to the UIS goal #3, Making a Difference in the World.

Completion of the degree leads to eligibility for certification as a Medical Laboratory Scientist by the Board of Certification of the American Society of Clinical Pathology. Issuing of the degree is not contingent on passing any type of external certification or licensure examination. The UIS CLS Program has 100% employment of graduates seeking jobs in medical laboratories. The UIS Clinical Laboratory Science Program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), 5600 N. River Rd., Suite 720, Rosemont, IL 60018 (phone: (773) 714-8880).

Program Features/Requirements

The Clinical Laboratory Science curriculum at UIS provides a solid science foundation as well as preparation for certification as a medical laboratory scientist. The first two years of the four-year major are considered the PreProfessional Phase. During this time, the student completes the general education requirements of the university and the prerequisites for the Professional Phase. The last two years are considered the Professional Phase or the CLS Program; this includes the summer between the last two years. The Professional Phase, the CLS Program, is accredited by NAACLS (see above).

Both UIS students and transfer students must submit an application for the Professional Phase, the CLS Program. Students must meet the Essential Functions and health requirements, including immunizations, outlined on the Allied Health website in the CLS Student Handbook and the admissions packet available from the department office manager. See the "BACHELOR’S DEGREE" section for the Admissions requirements and processes.

Initial academic work is designed to provide a strong background in biochemistry, microbiology, and immunology. As the program proceeds, students receive theory and laboratory experience in all areas of medical laboratory science. The student’s clinical education encompasses rotations through the various clinical specialty areas of affiliated medical laboratories. The clinical experience is under the joint supervision of faculty at the University of Illinois at Springfield and practicing professionals in affiliated hospital laboratories. These rotation courses integrate the theory and practice of prerequisite campus courses with the professional practice and sophisticated instrumentation at the medical laboratory. Enhancement experiences are available in areas of interest to the student. A list of the current affiliated medical laboratories can be found on the Allied Health website. All facilities where students rotate are accredited. The program concludes with courses such as Health Care Management and a capstone Clinical Correlations course.

A criminal background check is required before clinical rotations. A background check that is not "clear" precludes rotations at some hospitals and prevents employment at most healthcare facilities. A drug screen is also required prior to clinical rotations.

Honors in Clinical Laboratory Science (Department Honors)

CLS majors with a cumulative GPA equal to or greater than 3.25 in the Allied Health Department and one semester in residency at UIS may elect to participate in the CLS honors option. In addition to the CLS Program requirements, honors students must:

1. maintain a minimum cumulative GPA of 3.25,
2. earn a minimum grade of B- for each course in the CLS Program,
3. successfully complete three credits of CLS 400 Applied Research or CLS 499 Tutorial, and
4. present their findings in a formal paper and public presentation.

Students must apply for participation in the honors program to the Allied Health Department chair and obtain approval of a faculty research advisor prior to their final semester. This is not connected with the CAP Honors Program. Details can be found in the CLS Student Handbook on the Allied Health website.

- Medical Laboratory Technician (MLT) – Clinical Laboratory Science (CLS) Articulation (http://catalog.uis.edu/undergraduate-students/clas/clinicallabscience/mlt)
- Pre-Medical Concentration (http://catalog.uis.edu/undergraduate-students/clas/clinicallabscience/premedical)

Advising

All students are encouraged to meet with the Allied Health Chair/CLS Program Director or a CLS advisor before initial registration and periodically thereafter in order to plan their courses of study to ensure that all requirements are met in the minimum amount of time. There is no advance placement and no credits for experiential learning.

Students are advised to be familiar with the current CLS Student Handbook and ask a CLS advisor for help if they do not understand the CLS policies and procedures.

The transfer option provides for the continuing education of students who have completed the first two years of lower-division work (preferably with the A.A. or A.S. degree). The CLS program has two + two articulation agreements with several community colleges; however, transfer students from other two-year and four-year institutions are also encouraged to apply. See the Allied Health Chair/CLS Program Director regarding questions about transfer of credits.

Students should consult with college advisors for specific guidance regarding completion of general education requirements. In CLS, the clinical rotation courses fulfill the requirement for the ECCE Engagement Experience (six hours) and ECCE: Health Care Management is a U.S. Communities course.

For best outcomes in the Program and on the national certification exam, part-time status is not recommended. Because the CLS Program proceeds in cohorts, off-sequence students will need to reapply for the cohort with which they will do the full-time clinical rotation courses.

**CLS Required Courses**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CLS 321</td>
<td>Seminar in Clinical Laboratory Science</td>
<td>2</td>
</tr>
<tr>
<td>CLS 347</td>
<td>Medical Bacteriology</td>
<td>4</td>
</tr>
<tr>
<td>CLS 401</td>
<td>Introduction to Clinical Chemistry</td>
<td>2</td>
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<tr>
<td>CLS 402</td>
<td>Introduction to Hematology</td>
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<td>CLS 403</td>
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<td>CLS 404</td>
<td>Introduction to Hemostasis</td>
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<td>CLS 405</td>
<td>Introduction to Urinalysis</td>
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<tr>
<td>CLS 411</td>
<td>ECCE: Health Care Management</td>
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<tr>
<td>CLS 421</td>
<td>ECCE: Clinical Chemistry Laboratory</td>
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<tr>
<td>CLS 422</td>
<td>ECCE: Clinical Hematology Laboratory</td>
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<td>CLS 423</td>
<td>ECCE: Clinical Microbiology Laboratory</td>
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<tr>
<td>CLS 424</td>
<td>ECCE: Clinical Immunohematology Laboratory</td>
<td>3</td>
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**Grading Policy**

Since the curriculum includes laboratory work done under professional supervision, the degree candidate not only must satisfy the customary expectations of academic work but also must meet the high-quality standards demanded of a professional medical technologist/clinical laboratory scientist. Students must maintain a minimum cumulative GPA of 2.0 at UIS. Clinical Laboratory Science students are required to maintain a grade of C- or better in all required courses.

**Courses**

**CLS 115. Solving Medical Mysteries. 3 Hours.**

This course is intended to answer commonly asked questions about human health and disease. An overview will briefly describe healthy human biology and function which will be contrasted with the abnormal functioning seen in major diseases. Actual clinical lab results will be presented in case stories that offer a glimpse into "what is going on inside" the diseased patient. Armed with this type of information, students can become more active and effective consumers within the healthcare system. Course Information: This course fulfills a general education requirement at UIS in the area of Life Science without a Lab.

**CLS 131. Introduction to Forensic Science. 3 Hours.**

Introduces the scientific basis of forensics investigations. Discusses basic procedures for investigation of crime scenes through deductive reasoning, case history/problem-solving approach. Topics include fingerprints, soil/imprints, toxicology, ballistics, blood/body fluid analysis, DNA fingerprints, and PCR technology. Course Information: Same as CHE 131. This course fulfills a general education requirement at UIS in the area of Physical Science without a Lab.

**CLS 132. Introduction to Forensic Science Laboratory. 1 Hour.**

This laboratory will illustrate many of the basic scientific procedures and analyses used in forensic science laboratories. Exercises will include fingerprinting, hair/fiber analysis, soil/glass analysis, PCR and DNA profiling, toxicology, blood spatter analysis, and field tests for blood, semen, and drugs. This optional laboratory to be taken with CLS 131. Course Information: Same as CHE 132. This course, with CLS 131, fulfills a general education requirement at UIS in the area of Physical Science with a Lab.

**CLS 201. Introduction to Clinical Laboratory Science. 1 Hour.**

An introduction to health care in general and the medical laboratory profession in particular. Students will create a plan for pursuing a health career. Students will also learn how to be better consumers of medical laboratories.
CLS 225. Nutrition. 3 Hours.
Provides a foundation in the basic principles of human nutrition in maintaining and promoting health. Application of basic biological concepts such as cell function and heredity, as well as personal and societal applications of nutrition will enable students to make informed decisions. Course Information: This course fulfills a general education requirement at UIS in the area of Life Science without a Lab.

CLS 321. Seminar in Clinical Laboratory Science. 2 Hours.
A writing-intensive course which serves as an introduction to the clinical laboratory science program. Professionalism, ethics, and adult learning are discussed. Introduction to research and critique of scientific literature are included. Instruction and experience in blood collection techniques are included.

CLS 325. Evidence-Based Research Concepts. 3 Hours.
This course will focus on outlining the foundation of evidence-based practice in health sciences. The students will gain a basic understanding of principles in evidence-based practice and how to incorporate those principles into clinical practice. Course Information: Same as EXR 325.

CLS 347. Medical Bacteriology. 4 Hours.
Concise overview of pathogenic bacteriology. Includes discussion of techniques for culturing and identifying bacteria and an introduction to epidemiology. Required of clinical laboratory science students. Offered fall semester. Course Information: Same as BIO 347. Prerequisite: BIO 345 and BIO 346.

CLS 400. Applied Research. 1-4 Hours.
Directed research in procedure development or in-depth investigation of a specific area in clinical laboratory science. Topic approved and hours assigned by instructor. Written report required. Course Information: May be repeated to a maximum of 4 hours.

CLS 401. Introduction to Clinical Chemistry. 2 Hours.
Lecture/laboratory course focusing on clinical significance and methodology of carbohydrates, proteins, lipids, enzymes, electrolytes, blood gases, acid-base balance, liver function, kidney function, and endocrinology. Emphasis on quality control as it applies to selected clinical chemistry procedures. Course Information: Prerequisite: CHE 433 or equivalent.

CLS 402. Introduction to Hematology. 2 Hours.
Lecture/laboratory course that emphasizes basic hematologic principles. Manual and automated procedures are performed. Emphasis on morphology and clinical applications. Course Information: Prerequisite: CLS 448 or equivalent.

CLS 403. Introduction to Immunohematology. 2 Hours.
Lecture/laboratory course emphasizing immunohematologic concepts and properties underlying scientific principles of blood banking. Includes theory and practical applications of blood-group systems, antibody identification and compatibility testing, hemolytic disease of the newborn, autoimmune hemolytic anemia, and donor procurement and processing. Course Information: Prerequisite: CLS 448 or equivalent.

CLS 404. Introduction to Hemostasis. 1 Hour.
Lecture/laboratory course that emphasizes components in the blood related to hemostatic mechanisms. Includes principles of procedures involved and their relationship to diagnosis and treatment of disease. Course Information: Prerequisite: BIO 141 or equivalent.

CLS 405. Introduction to Urinalysis. 2 Hours.
Lecture/laboratory course emphasizing qualitative, quantitative, and microscopic examination of urine. Includes special analytical procedures and their relationship to diagnosing and monitoring disease and health. Course Information: Prerequisite: BIO 141 or equivalent and CHE 141 or equivalent.

CLS 411. ECCE: Health Care Management. 3 Hours.
Explores the health care community and groups affected by health care delivery in the United States. Emphasis is on management, including personnel issues, financial issues, regulatory issues, and educational principles using the example of the medical laboratory. This course is open to non-CLS majors. Course Information: This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of U.S. Communities.

CLS 421. ECCE: Clinical Chemistry Laboratory. 1-5 Hours.
Experience in clinical hematology, includes advanced instrumentation using automated hematology and coagulation analyzers. Includes microscopic examination of blood smears. Laboratory data is interpreted in light of various disease states and disorders. Prerequisite: Senior in Clinical Laboratory Science program. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

CLS 422. ECCE: Clinical Hematology Laboratory. 1-4 Hours.
Experience in clinical hematology, includes advanced instrumentation using automated hematology and coagulation analyzers. Includes microscopic examination of blood smears. Laboratory data is interpreted in light of various disease states and disorders. Prerequisite: Senior in Clinical Laboratory Science program. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

CLS 423. ECCE: Clinical Microbiology Laboratory. 1-4 Hours.
Isolation and identification of clinically important microorganisms from a variety of body sites. Includes antibiotic susceptibility testing. Course Information: Prerequisite: Senior in Clinical Laboratory Science program. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

CLS 424. ECCE: Clinical Immunohematology Laboratory. 1-3 Hours.
Blood typing, antibody screening and identification, compatibility testing, and other immunohematologic procedures are included. Emphasis is on operation and problem-solving in a modern transfusion service. Course Information: Prerequisite: Senior in Clinical Laboratory Science program. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Engagement Experience.

CLS 431. Special Topics in Clinical Laboratory Science. 1-6 Hours.
Directed research and observational experience opportunities in alternative clinical laboratory science practice arenas. Topics and sites must be approved by the instructor. Written report required. Course Information: Prerequisite: Senior in Clinical Laboratory Science program. May be repeated to a maximum of 6 hours if topics vary.
CLS 447. Medical Mycology, Parasitology and Virology. 4 Hours.
Overview of medically significant fungi, parasites, and viruses. Emphasis will be placed on pathogenesis, modes of transmission, and identification. Laboratory techniques used in isolation, cultivation, and identification will be used. Also included will be discussions of epidemiology and host response regarding these microorganisms. Course Information: Prerequisite: BIO 141 or equivalent.

CLS 448. Introduction to Immunology. 3 Hours.
Immunologic principles, concepts, and techniques will be discussed, including components of the immune system, cellular and humoral immune response, and antigen-antibody reactions. Human diseases related to compromised immunity will be introduced. Course Information: Same as BIO 448. Prerequisite: BIO 141 or equivalent.

CLS 449. Introductory Immunology Lab. 1 Hour.
Basic immunology and serology procedures with emphasis on medical laboratory diagnostic procedures. Course Information: Same as BIO 449. Prerequisites: BIO 141 or equivalent, CLS 448 or concurrent.

Lecture/laboratory focusing on problem-solving and special techniques used in antibody identification and compatibility testing. Also includes a discussion of donor requirements, blood component preparation and therapy, and quality assurance in the blood bank/transfusion service. Course Information: Prerequisite: CLS 403.

CLS 452. Advanced Concepts in Hematology. 2 Hours.
Lecture/laboratory focusing on advanced principles of hematologic testing leading to improved interpretative skills in hematology. Emphasis on correlation of data with disease states and disorders. Case studies and discussion used to illustrate the pathophysiology of hematological dysfunction. Course Information: Prerequisite: CLS 402.

CLS 454. Advanced Concepts in Clinical Chemistry. 2 Hours.
Lecture/laboratory focusing on clinical significance and methodology of trace elements, vitamins, therapeutic drug monitoring, and toxicology. Newer testing methods used to identify diseases/disorders will be discussed. Emphasizes instrument selection and method validation process. Course Information: Prerequisite: CLS 401.

CLS 456. Clinical Correlations. 2 Hours.
Use of problem-based case studies to analyze clinical situations and correlate laboratory data. Course Information: Senior in Clinical Laboratory Science Program.

CLS 471. ECCE: Emerging Diseases. 3.4 Hours.
Examines the global emergence of previously unknown or re-emergent infectious diseases. Historical and current diseases will be discussed by integrating the perspectives of medical science and public health in contexts of social systems, economics, politics, and geography. Challenges and remedies in an interdependent but unequal world will be discussed. Course Information: Same as MPH 471. This course fulfills an Engaged Citizenship Common Experience requirement at UIS in the area of Global Awareness.

CLS 480. Topics in Clinical Laboratory Science. 1-4 Hours.
Selected topics of interest in current Clinical Laboratory Science. Topic(s) for a semester will be stated in the class schedule. Course may include laboratory. Course Information: Prerequisite: Dependent on topic. May be repeated if topics vary.

CLS 499. Tutorial. 1-4 Hours.
Intended to supplement, not supplant, regular course offerings. Students interested in a tutorial must secure the consent of the faculty member concerned before registration and submit any required documentation to him or her. Course Information: May be repeated to a maximum of 4 hours if topics vary.