

Clinical Laboratory Science Certificate Program

Chairperson: April L. Harkins, Ph.D., MT(ASCP)

Department of Clinical Laboratory Science website

The mission of the Department of Clinical Laboratory Science is to educate persons to be highly skilled in laboratory medicine and possess those professional qualities necessary for the practice of clinical laboratory science. The certificate awarded in this department qualifies one to work as a clinical laboratory scientist (a.k.a., medical laboratory scientist or medical technologist) in hospital laboratories, clinics, physicians' offices, research and teaching laboratories, as well as in biotechnology and pharmaceutical companies and public health labs.

The Clinical Laboratory Science certificate program sequence commences with the first year in classrooms and labs on campus. The teaching laboratories on the university campus are structured to simulate a clinical setting and students have opportunities to experiment with modern technologies and diagnostic instrumentation. The clinical practicum required for this certificate occurs during the second year and involves clinical rotations in laboratories in the metro-Milwaukee area.

Accreditation

The Clinical Laboratory Science program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences; 5600 N. River Road, Suite 720; Rosemont, IL 60018; (773) 714-8880. Upon successful completion of the course work and practicum, students are eligible for the appropriate certification and/or licensure examinations. The university assumes no responsibility for the success of its students in obtaining professional certification or other types of professional licensure.

Admission requirements

1. U.S. citizen with a completed undergraduate degree from a regionally accredited university in a science-related field with minimum 2.800 cumulative and science GPA's.
2. Completion of the following course prerequisites at a regionally accredited college/university (with a minimum C grade):
 - a. Two courses in general biology, lab not required
 - b. Two courses in general chemistry (year sequence), with lab
 - c. One course in biochemistry (minimum 3 credit survey course). Must be completed within 5 years.
 - d. One course in organic chemistry, with lab (of a year-long sequence)
 - e. One course in physiology or a complete anatomy and physiology (A&P) sequence minimum 5 credits. Must be completed within 5 years.

Certain essential functions represent the non-academic requirements of the program that a student must possess to successfully complete the program and become employable. These include: the ability to distinguish colors, the ability to learn to perform and interpret highly complex testing methods and the ability to disseminate information in an accurate and confidential manner. Students must have good tactile skills, possess adequate physical and emotional health to work under stress and time constraints and demonstrate respect and care for others. Students must also be able to work efficiently and accurately in a clinical laboratory environment that often includes:

- Loud noises
- Strong odors
- Biohazardous materials
- Repetitive motions
- Standing for long periods of time

Ordinarily, CLLS courses are not approved for transfer from other institutions with the exception of CLLS 3160 Molecular Diagnostics: Laboratory Techniques. The following courses must be taken in the year immediately preceding the final (clinical) year:

CLLS 7124	Medical Bacteriology	4
CLLS 7127	Medical Microbiology	4
CLLS 7140	Laboratory Instrumentation	3
CLLS 7173	Analytical and Clinical Chemistry	4
CLLS 7174	Clinical Hematology 1	4

Professional Standards

In addition to being evaluated through the use of written examinations and assignments, class participation and practical examinations, clinical laboratory science students are also evaluated with respect to their professional qualities. The instructors in most clinical laboratory science courses complete a written evaluation of each student. Students who fail to comply with the rules and regulations of the department with respect to immunizations, health insurance, safety, honesty or whose conduct or health is unsatisfactory may be dismissed from the CLLS certificate program.

During the final (clinical) year, students are subject to academic and professional policies of the department as well as the rules and regulations of the affiliating clinical facility to which they are assigned. Students who are in violation of the rules and regulations of the clinical facility are subject to dismissal from that facility. This action is under the jurisdiction of the authorities of that institution in consultation with the university department chair.

In clinical laboratory science courses, a student who in any way acts dishonestly in class assignments or examinations is in violation of the University Academic Honesty policy and may be subject to dismissal from the certificate program.

For the safety of patients, peers and themselves, students are required to dress appropriately while attending clinical laboratory science sessions for all courses.

Academic Progression

Successful program progression requires students to complete each term in a lock-step sequence with a grade of C or higher in all courses in the certificate program. Each course is only offered once each academic year and should a student fall out of sequence, they will be delayed one year to continue. Students who fail to maintain progress necessary to meet the minimum requirements because of grade point average or excessive failure (F or U) grades are subject to review by the CLLS Progress and Promotions Committee, and they may be dismissed from the CLLS certificate program.

During the final (clinical) year the academic actions taken are varied in severity dependent upon the scholastic and/or professional deficiency. These actions are the following: written warning, clinical academic warning, clinical academic censure and required to withdraw. The method of making up unacceptable grades during the final year which have resulted in the issuing of an action of clinical academic warning or clinical academic censure are determined by mutual agreement between the university department chair and the affiliation clinical program director. The CLLS Progress and Promotion Committee prescribes, in writing, conditions under which these students are allowed to continue. Students who do not meet the conditions thus stipulated are dismissed from the certificate program.

Students must have a criminal background check prior to beginning their clinical assignments. Some clinical sites may have requirements beyond those of the university (e.g. physical examination, drug testing, etc.). Students are expected to participate in the state clinical laboratory science conference during the final (clinical) year of the program.

Clinical Laboratory Science Certificate Program

The certificate in Clinical Laboratory Science requires completion of the following courses:

PHIL 4336	Applied Ethics for the Health Sciences	1
CLLS 2200	Concepts in Clinical Laboratory Medicine	3
CLLS 3160	Molecular Diagnostics: Laboratory Techniques	3
CLLS 7124	Medical Bacteriology	4
CLLS 7127	Medical Microbiology	4
CLLS 7140	Laboratory Instrumentation	3
CLLS 7173	Analytical and Clinical Chemistry	4
CLLS 7174	Clinical Hematology 1	4
CLLS 7180	Concepts in Clinical Education Methods and Practicum	1
CLLS 7181	Modern Management Concepts for the Clinical Laboratory and Practicum	1
CLLS 7183	Clinical Chemistry and Practicum	6
CLLS 7184	Clinical Hematology 2 and Practicum	4
CLLS 7185	Clinical Hemostasis and Practicum	3
CLLS 7186	Clinical Immunohematology and Practicum	6
CLLS 7187	Clinical Immunology and Practicum	2
CLLS 7188	Clinical Microbiology and Practicum	6
CLLS 7189	Clinical Urinology and Practicum	2
Total Credit Hours		57

Students must complete all CLLS courses with a C or better and have a cumulative GPA of at least 2.200 prior to entering the final clinical year (fall/spring) of the program.

Tuition and Financial Aid

Individuals accepted to the CLLS Certificate program are admitted to Health Science Professional. As a certificate program, students may be eligible for financial aid. Completion of the Free Application for Federal Student Aid (FAFSA) is required in order to apply for financial aid.

Courses

CLLS 7124. Medical Bacteriology. 4 cr. hrs.

Emphasis on the theoretical foundations and methodologies needed in a medical bacteriology laboratory. Topics include: cultivation, isolation, microscopy, and antibiotic susceptibility testing. Morphological, cultural, biochemical, and immunological characteristics of bacteria examined as a basis for their differentiation and identification. Epidemiology, pathogenicity, and treatment of bacterial infections explored. Concepts of the immune response included. Prereq: Admitted to certificate program in clinical laboratory science.

CLLS 7127. Medical Microbiology. 4 cr. hrs.

Study of the identification and differentiation of pathogens and normal flora of humans based upon correlation of morphological, biochemical, immunological, and molecular characteristics. Epidemiology, pathogenicity, and treatment modalities are also investigated. Fungi, parasites, viruses, and bacteria are studied. Laboratory involves isolation and identification of medically important microorganisms, including proper patient specimen processing. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7124.

CLLS 7140. Laboratory Instrumentation. 3 cr. hrs.

Application of the principles of basic electronics, spectrophotometry, fluometry, electrochemistry, flame emission, atomic absorption and flow cytometry to laboratory instruments used in diagnostic and research laboratories. Selected laboratory experiments investigate these applications as related to clinical chemistry and hematology. Background in quality assurance is provided. Focuses on team problem-solving and instrument trouble-shooting. Prereq: Admitted to certificate program in clinical laboratory science.

CLLS 7173. Analytical and Clinical Chemistry. 4 cr. hrs.

Concepts of analytical chemistry including mathematical treatment of data, chemical and acid-base equilibria, buffers and electrochemistry. Application of theoretical aspects to measurement and evaluation of acid-base and electrolyte balance in the human body. Principles and application of electrophoretic and chromatographic analysis of clinical specimens. The components of blood and body fluids and their chemical analysis in disease states. Selected laboratory exercises emphasize quality assurance and integration of automated and manual clinical methods. Prereq: Admitted to certificate program in clinical laboratory science.

CLLS 7174. Clinical Hematology 1. 4 cr. hrs.

Study of identification and differentiation of blood and bone marrow cells with emphasis on morphology, function and pathology of these cells. Includes the study of blood parasites. Principles of methodologies used and their relationship to diagnosis and treatment of disease. Laboratory provides experience in identification of cellular elements in normal and disease states. Prereq: Admitted to certificate program in clinical laboratory science.

CLLS 7180. Concepts in Clinical Education Methods and Practicum. 1 cr. hr.

Educational concepts especially appropriate to instruction in a clinical setting using clinical materials. Concepts discussed include: writing learning objectives, learning styles, testing and evaluation methods and use of audio-visuals. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 4173.

CLLS 7181. Modern Management Concepts for the Clinical Laboratory and Practicum. 1 cr. hr.

Comparison of management theories and styles for effective leadership. Principles and methods of communication essential to the delivery of quality health care. Strategic financial planning ensuring cost effectiveness in the diagnostic laboratory. Statistical analysis comparing alternative methodologies for selection of reliable laboratory procedures. Selected projects relating managerial practices to clinical laboratory organization and use of laboratory data systems for health care delivery. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7173.

CLLS 7183. Clinical Chemistry and Practicum. 6 cr. hrs.

The chemical constituents of blood and other body fluids in health and disease. Principles of the methods used in qualitative and quantitative determination of these constituents. Treatment of the theoretical aspects of instrumentation used in these determinations. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7173.

CLLS 7184. Clinical Hematology 2 and Practicum. 4 cr. hrs.

Quantitative and qualitative study of blood, bone marrow and body fluid cells and alterations present in disease. Principles of procedures used. Methods of obtaining and preserving blood specimens with consideration of the theory and practice of aseptic technique. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7173.

CLLS 7185. Clinical Hemostasis and Practicum. 3 cr. hrs.

The components in the blood related to the hemostatic mechanisms, the principles of the procedures involved and their relationship to the diagnosis and treatment of disease. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7173.

CLLS 7186. Clinical Immunohematology and Practicum. 6 cr. hrs.

Therapeutic and diagnostic aspects of immunohematology. Aspects of blood transfusion and of methods used in preservation and selection of properly matched blood for transfusion. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7173.

CLLS 7187. Clinical Immunology and Practicum. 2 cr. hrs.

The diagnostic procedures used to determine immune system status and diagnosing immunodeficiency, autoimmunity and immunoproliferative diseases. The use of immunoassays to diagnose bacterial and viral infections and malignancies. Basic immunology is reviewed. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7173.

CLLS 7188. Clinical Microbiology and Practicum. 6 cr. hrs.

Advanced study of pathogenic and normal flora microorganisms having medical importance. Includes methods for obtaining and handling specimens for culture as well as principles of current instrumentation. Identification protocol include cultural, morphological, biochemical, immunological, and molecular characteristics. Examines pathophysiology of infectious diseases caused by bacteria, fungi, parasites and viruses. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7124, CLLS 7127 and CLLS 7173.

CLLS 7189. Clinical Urinology and Practicum. 2 cr. hrs.

Physical, chemical and microscopic study of urine with emphasis on the changes exhibited in disease with related physiology. Prereq: Admitted to certificate program in clinical laboratory science; CLLS 7173.

CLLS 7995. Independent Study in Clinical Laboratory Studies. 1-4 cr. hrs.

Advanced study of a selected topic under the direction of a faculty member from the Department of Clinical Laboratory Science. Prereq: Admitted to certificate program in clinical laboratory science; cons. of dept. ch.