MEDICAL LABORATORY SCIENCE, BHS

Website: https://www.washburn.edu/academics/college-schools/applied-studies/departments/allied-health/bhs/cls/index.html (https://www.washburn.edu/academics/college-schools/applied-studies/departments/allied-health/bhs/cls/)

Priority Deadline for Application: December 1

Mission

Upon completion of the medical laboratory science (CLS) education program, the graduate will be the health care team professional responsible for providing laboratory information that is timely, cost-effective and of high quality. The laboratory professional will demonstrate a command of medical laboratory science theory and application such that s/he develops, implements, and evaluates the total laboratory process to improve patient care outcomes.

Washburn University Assessment – Program Student Learning Outcomes

The CLS graduate will demonstrate:

- PSLO 1: Competence through their ability to interpret, assess validity and correlate medical information relevant to their professional discipline.
- PSLO 2: Technical proficiency in all skills necessary to fulfill their professional discipline.
- PSLO 3: Professional behavior consistent with expectations of their professional discipline.

Description of Program

The CLS Program provides patient-centered educational opportunities, with theoretical knowledge and practical experience in hematology, clinical chemistry, microbiology, immunohematology (blood bank), immunology, molecular diagnostics and laboratory management. The program emphasizes laboratory principles and procedures, clinical significance and application, principles and practice of quality assurance, principles of laboratory management and supervision, safety, instructional methods, and computer applications.

CLS Program Goals

- Graduate technically competent practitioners, who interpret, assess validity and correlate clinical laboratory data.
- Instill the highest standards of performance and professional ethics in all graduates.
- Provide graduates with tools that promote sound, independent judgment, successful problem-solving abilities, and essential educational and administrative skills.
- Graduate professionals who are effective communicators with all members of the health care team, patients and the public (community).
- Support and mentor the development of professional responsibility to include lifelong learning activities, teamwork skills, and the ability to adapt to and facilitate change.
- Graduate professionals who actively educate others regarding the integral role of medical laboratory scientists in delivering quality patient care.
- Prepare graduates to pass national certification examinations in order to enter professional practice.

Accreditation

Washburn University's CLS program, in conjunction with the University of Nebraska Medical Center, is accredited by:

National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)
5600 N River Road, Suite 720
Rosemont, IL 60018
(773) 714-8880

Admission Requirements

This program has special admission requirements due to limited enrollment.

In addition to the 43 hours of major coursework listed below, students must meet all prerequisites, general education and university requirements. The prerequisites include a minimum of 16 credit hours of biology and 16 credit hours of chemistry. Interested students should contact the CLS advisor for information about the prerequisites, application requirements and priority application deadlines.

Some students complete a Bachelor of Science degree prior to entering the CLS program. These students should contact the CLS advisor to determine program eligibility.

Degree Requirements

In addition to the requirements stated below, students must complete 34-35 hours of General Education (https://catalog.washburn.edu/undergraduate/programs-degrees-graduation-requirements/general-education-requirements/) and any additional hours needed to reach the minimum 120 credit hours required for graduation. Some of the courses below may also fulfill general education or other degree requirements. Please see your advisor for more information.

Code	Title	Hours
Required Courses Inside Department [1]		
CL 407	Clinical Laboratory Operations	2
CL 408	Introduction to Clinical Hematology	2
CL 409	Introduction to Microbiology	2
CL 410	Introduction to Clinical Chemistry & Urinalysis	1
CL 411	Introduction to Clinical Immunohematology	1
CL 412	Clinical Laboratory Science Theory, Application, Correlation	5
CL 413	Clinical Endocrinology & Toxicology	1
CL 414	Clinical Chemistry & Urinalysis I	2
CL 415	Clinical Chemistry & Urinalysis II	2
CL 416	Clinical Hematology I	2
CL 417	Clinical Hematology II	2
CL 418	Clinical Microbiology I	2
CL 419	Clinical Microbiology II	2
CL 420	Clinical Immunology & Molecular Diagnostics	2

CL 422	Clinical Immunohematology I	2
CL 423	Clinical Immunohematology II	2
CL 430	Clinical Laboratory Management I	2
CL 431	Clinical Laboratory Management II	3
CL 442	Clinical Immunohematology Practicum I	1
CL 443	Clinical Immunohematology Practicum II	1
CL 444	Clinical Core Lab Practicum I	1
CL 445	Clinical Core Lab Practicum II	1
CL 448	Clinical Microbiology Lab Practicum I	1
CL 449	Clinical Microbiology Lab Practicum II	1
Subtotal		43
Required Courses Outside Department [1]		
BI 192	General Cellular Biology	5
BI 255	Human Physiology	3-4
or BI 230	Introduction to Human Physiology	
BI 301	General Microbiology	4
BI 333	General Genetics	3-4
or BI 354	Molecular Biology Laboratory	
BI 362	Immunology	3
CH 151	Fundamentals of Chemistry I	5
CH 152	Fundamentals of Chemistry II	5
CH 340	Organic Chemistry I	3
Select one course from the following:		3
CH 320	Analytical Chemistry	
CH 341	Organic Chemistry II	
CH 350	Biochemistry I	
EN 300	Advanced College Writing	3
or EN 308	Scientific and Technical Writing	
WU 101	The Washburn Experience	3
Subtotal		40-42
Total Hours		**83-85**

[1] Students must receive a C or better in each course.

CL 407 Clinical Laboratory Operations (2)
This course provides a basic introduction to the theory, practical application, technical performance and evaluation of laboratory skills specific to the practice of clinical laboratory science. Laboratory safety; microscopy; pipetting; general laboratory equipment; quality control; mathematics; phlebotomy; pre-analytic, analytic and post-analytic processes, including specimen collection, processing and transport to maintain test result integrity, will be addressed. Prerequisite: Admission to the Clinical Laboratory Science program.

CL 408 Introduction to Clinical Hematology (2)
This course introduces the theory, practical application, technical performance and evaluation of hematological and hemostasis procedures. There is an emphasis on the correlation of clinical laboratory data with the diagnosis of erythrocyte, leukocyte and bleeding/clotting disorders. Prerequisite: Admission to the Clinical Laboratory Science program.

CL 409 Introduction to Microbiology (2)
This course introduces the theory, practical application, technical performance and evaluation of procedures for isolation, identification and susceptibility testing of infectious disease organisms in humans. The course focuses on bacteriology, emphasizing the correlation of clinical laboratory data with the patient's diagnosis and treatment. Prerequisite: Admission to Clinical Laboratory Science program.

CL 410 Introduction to Clinical Chemistry & Urinalysis (1)
This course introduces the theory, practical application, technical performance and evaluation of basic laboratory skills and methods in clinical chemistry and urinalysis. Correlation of laboratory data with the diagnosis and treatment of carbohydrate, renal, liver, protein, electrolyte and acid-base disturbances is emphasized. Prerequisite: Admission to Clinical Laboratory Science program.

CL 411 Introduction to Clinical Immunohematology (1)
This course introduces the theory, practical application, technical performance and evaluation of immunohematology procedures required for the collection, processing, storage and transfusion of blood and blood components and management of immunohematologic conditions. Prerequisite: Admission to Clinical Laboratory Science program.

CL 412 Clinical Laboratory Science Theory, Application, Correlation (5)
This course includes the application, evaluation and correlation of laboratory procedures used in the diagnosis and treatment of common disease states. Opportunities for building critical thinking, oral communication, professional behavior, and teamwork skills are provided in small group clinical case decisions.

CL 413 Clinical Endocrinology & Toxicology (1)
This course incorporates advanced theory, practical application, and evaluation of clinical chemistry laboratory procedures. Correlation of clinical laboratory data with diagnosis and treatment of endocrine disorders, toxicology disturbances and therapeutic drug monitoring is emphasized.

CL 414 Clinical Chemistry & Urinalysis I (2)
This course expands on the theory, practical application, technical performance and evaluation of basic laboratory procedures introduced in CL410, Introduction to Clinical Chemistry and Urinalysis. This course will focus on the interpretation, evaluation, and correlation of clinical laboratory data with the diagnosis and treatment of carbohydrate, renal, liver, protein, cardiac, lipid, electrolytes, trace elements, pancreatic-GI and acid-base disturbances. Prerequisite: CL 410.

CL 415 Clinical Chemistry & Urinalysis II (2)
This course expands on the theory, practical application, and evaluation of laboratory procedures introduced in CL 414 Clinical Chemistry and Urinalysis I and CL 444 Clinical Core Laboratory Practical I. Correlation of clinical laboratory data with the diagnosis and treatment monitoring of carbohydrate, renal, hepatic, cardiac, lipid/lipoprotein, protein, major and minor electrolyte, trace element, enzyme, pancreatic-gastrointestinal and acid-base disorders; tumor markers; and inborn errors of metabolism is emphasized. Prerequisite: CL 414.

CL 416 Clinical Hematology I (2)
This course expands on the theory, practical application, technical performance and evaluation of hematological and hemostasis procedures introduced in Introduction to Clinical Hematology. There is an emphasis on the correlation of clinical laboratory data with the diagnosis and treatment of erythrocyte, leukocyte and bleeding/clotting disorders. Prerequisite: CL 408

CL 417 Clinical Hematology II (2)
This course expands on the theory, practical application, and evaluation of hematological and hemostasis procedures introduced in CL 416 Clinical Hematology I and CL 444 Clinical Core Laboratory Practicum I, and includes the analysis of cerebrospinal, synovial and serous fluids. Correlation of clinical laboratory data with the diagnosis and treatment of erythrocyte, leukocyte and bleeding/clotting disorders will be emphasized. Prerequisite: CL 416.

CL 418 Clinical Microbiology I (2)
This course expands on the theory, practical application, technical performance and evaluation of procedures for isolation, identification and susceptibility testing of infectious disease organisms in humans introduced in Introduction to Clinical Microbiology. The course focuses on bacteriology emphasizing the correlation of clinical laboratory data with patient's diagnosis and treatment. Prerequisite: CL 409.

CL 419 Clinical Microbiology II (2)
This course incorporates advanced theory, practical application, technical performance and evaluation of procedures for isolation, identification and susceptibility testing of infectious disease organisms in humans. This course includes bacteriology, mycology, parasitology, virology and serology, and emphasizes the correlation of clinical laboratory data with the patient's diagnosis and treatment. Prerequisite CL 418.

CL 420 Clinical Immunology & Molecular Diagnostics (2)
This course includes the theory, practical application, and evaluation of immunological components, principles and methodologies used in the assessment of immunologically related disorders, including hypersensitivity reactions, autoimmune, immunoproliferative and immunodeficienct disorders. The theory and application of molecular diagnostic tools, such as polymerase chain reaction (PCR), nucleic acide probes, and microarrays are also addressed. Prerequisite: Declared major in Clinical Laboratory Science and acceptance into CLS program.

CL 422 Clinical Immunohematology I (2)
This course expands on the theory, practical application, technical performance and evaluation of immunohematology procedures required for the collection, processing, storage and transfusion of blood and blood components and management of immunohematologic conditions that was introduced in CL 411 Introduction to Clinical Immunohematology. Prerequisite: CL 411.

CL 423 Clinical Immunohematology II (2)
This course incorporated advanced theory, practical application, technical performance and evaluation of blood bank procedures required for transfusion of blood and blood components and for handling and storage of blood and blood components. Prerequisite: CL 422.

CL 430 Clinical Laboratory Management I (2)
This course includes the theory, practical application, technical performance and evaluation of laboratory management principles and associated models. Lectures and assignments focus on effective written and oral communications, critical evaluation of research studies, compliance and regulatory issues, educational methodology, human resources financial management, laboratory operations, cultural competency, professionalism and ethical decision making. Opportunities to build problem-solving, teamwork and management skills are provided.

CL 431 Clinical Laboratory Management II (3)
This course includes the theory, practical application, technical performance and evaluation of laboratory management principles and associated models. Opportunities for building critical thinking, problem-solving, and management/professional leadership skills are provided. Prerequisite: CL 430.

CL 442 Clinical Immunohematology Practicum I (1)
This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical immunohematology procedures and preparation of blood components. Course content will include new skills and procedures, in addition to the skills and procedures presented in CL 407 Clinical Laboratory Operations and CL 411 Introduction to Clinical Immunohematology. Prerequisite: Admission to Clinical Laboratory Science program.

CL 443 Clinical Immunohematology Practicum II (1)
This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical immunohematology procedures and preparation of blood components. Course content will include new skills and procedures, in addition to the skills and procedures presented in CL 442 Clinical Immunohematology Practicum I. Prerequisite: Admission to the Clinical Laboratory Science program.

CL 444 Clinical Core Lab Practicum I (1)
This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical hematology/hemostasis, chemistry and urinalysis procedures. Course content will include new skills and procedures and the application of automation and automatic verfication techniques, building on the skills and procedures presented in CL 407 Clinical Laboratory Operations, CL 408 Introduction to Clinical Hematology and CL 410 Introduction to Clinical Chemistry and Urinalysis. Prerequisite: Admission to the Clinical Laboratory Science program.

CL 445 Clinical Core Lab Practicum II (1)
This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical hematology/hemostasis, chemistry and urinalysis procedures. Technical content will include new skills and procedures, in addition to CL 444 Clinical Core Practicum I. Prerequisite: Admission to Clinical Laboratory Science program.

CL 448 Clinical Microbiology Lab Practicum I (1)
This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical microbiology procedures. Course content will include new skills and procedures, in addition to the skills and procedures presented in CL 407 Clinical Laboratory Operations and CL 409 Introduction to Clinical Microbiology. Prerequisite: Admission to Clinical Laboratory Science program.

CL 449 Clinical Microbiology Lab Practicum II (1)
This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical microbiology procedures. Course content will include new skills and procedures, in addition to the skills and procedures presented in CL 448 Clinical Microbiology Laboratory Practicum I. Prerequisite: Admission to Clinical Laboratory Science program.