**DIVISION OF CLINICAL LABORATORY SCIENCE**

**Introduction**

Clinical laboratory science (CLS), also called "medical laboratory science," is the health profession that provides laboratory information and services needed for the diagnosis and treatment of disease. The field of clinical laboratory science combines many sciences, including microbiology, hematology, chemistry, molecular biology, and immunology. Clinical laboratory scientists perform a variety of laboratory tests, ensure the accuracy of the test results, explain the significance of laboratory test results, and evaluate new methods for laboratory tests. Some of the tests performed in the clinical laboratory are relatively simple. Others, such as DNA analysis and flow cell cytometry, are complex and require extensive education.

Examples of laboratory tests performed by clinical laboratory scientists include:

- Detection of the abnormal cells that cause leukemia
- Analysis of cardiac enzyme activity released during a heart attack
- Identification of the type of bacteria causing an infection
- Analysis of the coagulation factors in cases of abnormal bleeding
- Detection of blood group antibodies that cause transfusion reactions
- Analysis of genetic markers for cystic fibrosis
- Typing patients for histocompatibility matches prior to transplantation

**Admission to the Program**

A maximum of 20 students are chosen for admission each year. Students are selected on the basis of science and mathematics prerequisite courses, grades, a written application, interviews, and letters of recommendation. Successful completion of the prerequisite courses listed under the major does not guarantee admission to the program. Because enrollment is limited, students are encouraged to begin the application process early in the fall preceding the year of enrollment. The first deadline for completed applications is the second Tuesday in January. Completed applications received after that deadline will be considered for admission if positions are available in the program.

Students are subject to the requirements in place when they are admitted to this program; consequently, the requirements described in this catalog particularly apply to students admitted during the 2023–2024 academic year.

**Advising**

First-year and sophomore students interested in the clinical laboratory science (CLS) major have a primary academic advisor assigned in ConnectCarolina. Students are strongly encouraged to meet regularly with their advisor and review their Tar Heel Tracker each semester. The director of the Division of Clinical Laboratory Science is available to meet with current and prospective majors by appointment (see contact information above). The Division of Clinical Laboratory Science provides academic advising for students who are enrolled in the program. Further information on the curriculum may be obtained from the division’s website (https://www.med.unc.edu/ahs/clinical/).

**Facilities**

The laboratory facility for first-year clinical laboratory science courses includes individualized work areas with reagents, supplies, and laboratory instruments for students. In senior courses, students develop their skills in state-of-the-art clinical laboratory facilities.

**Graduate School and Career Opportunities**

Clinical laboratory science provides a basis for a broad range of future endeavors. Graduates with a B.S. degree in clinical laboratory science can elect to pursue further study in medicine, dentistry, veterinary medicine, business or management, hospital administration, computer science, education, clinical chemistry, clinical microbiology, immunology, or another laboratory science area. The Division of Clinical Laboratory Science also offers a master’s degree in clinical laboratory science.

Clinical laboratory scientists are employed in hospital laboratories, commercial laboratories, physicians’ office laboratories, research institutes, clinical trials, and forensic laboratories. Clinical laboratory scientists also may be employed as technical or sales representatives for corporations. Graduates of the program are very successful on national certification exams and enjoy high employment rates. See the alumni section of the website (https://www.med.unc.edu/ahs/clinical/) for examples of careers in clinical laboratory science.

**Major**

- Clinical Laboratory Science Major, B.S. (https://catalog.unc.edu/undergraduate/programs-study/clinical-laboratory-science-major-bs/)

**Professor**

Tara C. Moon.

**Assistant Professors**

Bai Li, Shawn Luby, Laine Stewart, Sara Taylor, Susan Taylor.

**Laboratory Manager**

Kristine Barnette.

**CLSC—Clinical Laboratory Science**

**Undergraduate-level**

CLSC 150. Current Topics in Clinical Laboratory Medicine. 1 Credits.
A survey of topics in laboratory medicine including transfusions, forensic science, infectious diseases, and hematologic diseases.

**Rules & Requirements**

**Grading Status:** Pass/Fail.

**Advanced Undergraduate and Graduate-level**

CLSC 410. Laboratory Mathematics. 1 Credits.
Permission of the instructor for nonmajors. Basic mathematical principles, calculations, quality assurance, and method validation relevant to the clinical laboratory.

**Rules & Requirements**

**Grading Status:** Letter grade.
CLSC 410L. Basic and Molecular Laboratory Methods. 2 Credits.
Majors only. Basic skills associated with the clinical laboratory including pipetting, spectrophotometry, standard curves, dilutions, and immunoassays. Molecular methods include small volume pipetting, microwell plating, nucleic acid extraction, and PCR techniques.

Rules & Requirements
Grading Status: Letter grade.

CLSC 420. Urinalysis and Body Fluids. 1 Credits.
Permission of the instructor for nonmajors. The physical, chemical, and microscopic analysis of body fluids in the clinical laboratory with an emphasis on correlation of laboratory data.

Rules & Requirements
Grading Status: Letter grade.

CLSC 420L. Urinalysis Laboratory. 1 Credits.
For Clinical Laboratory Science majors only. The physical, chemical, and microscopic examination of urine with an emphasis on the correlation of laboratory data.

Rules & Requirements
Grading Status: Letter grade.

CLSC 430. Biochemistry. 3 Credits.
Permission of the instructor for nonmajors. Physiological biochemistry of the metabolic pathways and alterations in selected diseases. Also includes principles and applications of molecular techniques in the clinical laboratory.

Rules & Requirements
Grading Status: Letter grade.

CLSC 440. Hematology I. 2 Credits.
Permission of the instructor for nonmajors. Introduction to normal hematopoiesis, blood cell function and identification, hematologic tests, principles of hemostasis, and hemostasis disorders.

Rules & Requirements
Grading Status: Letter grade.

CLSC 440L. Hematology Laboratory. 1 Credits.
Permission of the instructor for nonmajors. Basic clinical assays for identification and evaluation of erythrocytes, leukocytes, and platelets with an emphasis on microscopy. Also includes coagulation testing.

Rules & Requirements
Grading Status: Letter grade.

CLSC 442. Hematology II. 3 Credits.
Majors only. Hematologic disorders involving erythrocytes and leukocytes, with an emphasis on the analysis and interpretation of laboratory data.

Rules & Requirements
Grading Status: Letter grade.

CLSC 442L. Hematology II Laboratory. 1 Credits.
Majors only. Microscopic identification and evaluation of abnormal erythrocyte and leukocyte morphology, correlation with other laboratory data, and clinical interpretation.

Rules & Requirements
Grading Status: Letter grade.

CLSC 450. Immunology. 3 Credits.
Permission of the instructor for nonmajors. Basic immunology and serology. Innate and immune body defenses. The development and properties of cellular and humoral elements and their alterations in pathological and other conditions.

Rules & Requirements
Grading Status: Letter grade.

CLSC 460. Special Pathogens. 2 Credits.
Permission of the instructor for nonmajors. Study of clinically significant fungi, parasites, and atypical or unusual bacteria. Correlation of disease, disease transmission, mechanisms of pathogenicity, and diagnostic testing.

Rules & Requirements
Grading Status: Letter grade.

CLSC 460L. Parasitology and Mycology Laboratory. 1 Credits.
Permission of the instructor for nonmajors. Clinical laboratory diagnostic methods for human parasitic and fungal infections. Microscopic morphology of fungal organisms and parasites, including their various life cycle forms.

Rules & Requirements
Grading Status: Letter grade.

CLSC 462. Clinical Bacteriology. 3 Credits.
Majors only. Principles and practice of clinical bacteriology. Study of medically significant bacteria with correlation of human disease, mechanisms of bacterial pathogenicity, and laboratory diagnostics.

Rules & Requirements
Grading Status: Letter grade.

CLSC 462L. Clinical Bacteriology Laboratory. 2 Credits.
Majors only. A comprehensive course describing bacteria that infect humans. Correlation of diseases and pathological mechanisms of bacteria.

Rules & Requirements
Grading Status: Letter grade.

CLSC 460L. Parasitology and Mycology Laboratory. 1 Credits.
Permission of the instructor for nonmajors. Study of clinically significant fungi, parasites, and atypical or unusual bacteria. Correlation of disease, disease transmission, mechanisms of pathogenicity, and diagnostic testing.

Rules & Requirements
Grading Status: Letter grade.

CLSC 470. Clinical Chemistry. 3 Credits.
Majors only. An introduction to the methods of analysis used in the clinical chemistry laboratory. Emphasis on the correlation of chemistry laboratory values with disease states.

Rules & Requirements
Grading Status: Letter grade.

CLSC 470L. Clinical Chemistry Laboratory. 2 Credits.
Majors only. Performance of clinical laboratory assays for significant biochemical molecules. Principles of analysis, quality control, method evaluation, and basic laboratory instrumentation are presented.

Rules & Requirements
Grading Status: Letter grade.

CLSC 480. Immunohematology. 3 Credits.
Majors only. Introduction to blood group serology with an emphasis on the major blood group systems, pretransfusion testing, and antibody identification.

Rules & Requirements
Grading Status: Letter grade.
**CLSC 480L. Immunohematology Laboratory.** 2 Credits.
Majors only. Laboratory techniques for red cell typing, antibody identification, and pretransfusion testing.

**Rules & Requirements**
**Grading Status:** Letter grade.

**CLSC 540L. Clinical Hematology Laboratory.** 4 Credits.
Majors only. Laboratory rotation in clinical hematology.

**Rules & Requirements**
**Making Connections Gen Ed:** EE- Field Work.
**Requisites:** Prerequisite, CLSC 440.
**Grading Status:** Letter grade.

**CLSC 542L. Clinical Hemostasis Laboratory.** 2 Credits.
Majors only. Laboratory rotation in clinical coagulation.

**Rules & Requirements**
**Requisites:** Prerequisite, CLSC 440.
**Grading Status:** Letter grade.

**CLSC 550L. Clinical Immunology Laboratory.** 1 Credits.
Majors only. Laboratory rotation in clinical immunology.

**Rules & Requirements**
**Requisites:** Prerequisite, CLSC 450.
**Grading Status:** Letter grade.

**CLSC 560L. Clinical Microbiology Laboratory.** 4 Credits.
Majors only. Laboratory rotation in clinical microbiology.

**Rules & Requirements**
**Requisites:** Prerequisite, CLSC 462.
**Grading Status:** Letter grade.

**CLSC 570L. Clinical Chemistry Laboratory Rotation.** 4 Credits.
Majors only. Laboratory rotation in clinical chemistry.

**Rules & Requirements**
**Requisites:** Prerequisite, CLSC 470.
**Grading Status:** Letter grade.

**CLSC 580L. Clinical Immunohematology Laboratory.** 4 Credits.
Laboratory rotation in clinical immunohematology. Majors only.

**Rules & Requirements**
**IDEAs in Action Gen Ed:** HI-INTERN.
**Making Connections Gen Ed:** EE- Field Work.
**Requisites:** Prerequisites, CLSC 480 and 480L.
**Grading Status:** Letter grade.

**CLSC 582L. Clinical Transplantation Medicine Laboratory.** 1 Credits.
Majors only. Clinical rotation in histocompatibility, flow cytometry, and hematopoietic progenitor cell laboratories.

**Rules & Requirements**
**Requisites:** Prerequisite, CLSC 480.
**Grading Status:** Letter grade.

**CLSC 620. Clinical Laboratory Management.** 2 Credits.
Majors only. Foundation in the technical and nontechnical aspects of supervision and management of clinical laboratory testing.

**Rules & Requirements**
**Grading Status:** Letter grade.

**CLSC 630. Research Methods in Clinical Laboratory Science.** 2 Credits.
Majors only. An overview of the knowledge of research design and methods commonly used in the clinical laboratory research arena, providing the basis for the critical examination of professional literature.

**Rules & Requirements**
**IDEAs in Action Gen Ed:** RESEARCH.
**Making Connections Gen Ed:** CI.
**Grading Status:** Letter grade.

**CLSC 670. Clinical Laboratory Science Educational Methods.** 2 Credits.
Majors only. Introduction to the basic principles of clinical laboratory education, including objectives, learning formats, test development, and clinical teaching.

**Rules & Requirements**
**IDEAs in Action Gen Ed:** COMMBEYOND.
**Grading Status:** Letter grade.

**CLSC 695. Undergraduate Research in Clinical Laboratory Science.** 3 Credits.
This mentored and self-directed course provides students with research experience in the clinical laboratory field. Students will apply knowledge of research methods to generate results and communicate results to others. This is a clinical laboratory science elective course. Seniors only.

**Rules & Requirements**
**Requisites:** Prerequisite, CLSC 630 or CLSC 730.
**Grading Status:** Pass/Fail.

**Contact Information**
Division of Clinical Laboratory Science
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