

CLINICAL LABORATORY SCIENCE MAJOR, B.S.

Contact Information

Division of Clinical Laboratory Science

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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, 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.

Admission (<http://catalog.unc.edu/undergraduate/departments/division-clinical-laboratory-science/>) to the program is required.

Student Learning Outcomes

Upon completion of the Clinical Laboratory Science program, students should be able to:

- Perform and evaluate pre-analytical, analytical, and post-analytical procedures to ensure the quality of laboratory results
- Perform laboratory tests, analyze and verify results, and resolve common problems in all the major areas of the clinical laboratory
- Explain the principles and methods used in laboratory tests in all major areas of the clinical laboratory
- Explain the clinical significance of laboratory procedures in diagnosis and treatment of disease and maintenance of health
- Correlate information from different laboratory departments to verify results or resolve problems
- Evaluate patient results and suggest or select appropriate additional testing
- Determine the priority of laboratory requests and arrange the workload for optimal patient care and efficiency
- Obtain acceptable blood samples for laboratory tests using standard phlebotomy procedures
- Use quality assurance principles and practices to ensure the accuracy and reliability of laboratory information
- Perform preventive and corrective maintenance of equipment and instruments
- Use the principles of method evaluation to select new techniques and instruments
- Explain and apply the major principles and practices of laboratory administration, supervision, and budgeting
- Explain and apply principles of effective test utilization
- Comply with all standard safety regulations and monitor changes in safety regulations

- Use educational methods to present information and develop instructional materials
- Use computer systems to produce documents, research information, communicate with others, and enter and retrieve laboratory information
- Apply principles of management to the acquisition and evaluation of laboratory information systems
- Communicate effectively with laboratory personnel, other health care professionals, patients, and the public
- Demonstrate professional conduct and interpersonal skills with patients, laboratory personnel, other health care professionals, and the public
- Demonstrate ethical standards in all matters related to medical information and patient care

Requirements

In addition to the program requirements, students must

- attain a final cumulative GPA of at least 2.0
- complete a minimum of 45 academic credit hours earned from UNC–Chapel Hill courses
- take at least half of their major course requirements (courses and credit hours) at UNC–Chapel Hill
- earn a minimum of 18 hours of C or better in the major core requirements (some majors require 21 hours).

For more information, please consult the degree requirements section of the catalog (<http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/#degreerequirementstext>).

The schedule of academic work for clinical laboratory science majors includes the following General Education requirements. Students must complete all Foundations and Approaches requirements and take at least five Connections courses, including global issues, experiential education, and U.S. diversity. In addition, the following prerequisite courses must be completed before entering the Clinical Laboratory Science program:

Code	Title	Hours
Additional Requirements		
BIOL 101 & 101L	Principles of Biology and Introductory Biology Laboratory ^H	4
A second biology course (BIOL 202 is highly recommended)		3-4
CHEM 101 & 101L	General Descriptive Chemistry I and Quantitative Chemistry Laboratory I	4
CHEM 102 & 102L	General Descriptive Chemistry II and Quantitative Chemistry Laboratory II ^H	4
CHEM 241	Modern Analytical Methods for Separation and Characterization ^H	2
CHEM 241L	Laboratory in Separations and Analytical Characterization of Organic and Biological Compounds	1
One of the following:		3-4
MATH 130	Precalculus Mathematics	
MATH 231	Calculus of Functions of One Variable I ^H	
STOR 151	Introduction to Data Analysis	
Total Hours		21-23

H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

After admission (<http://catalog.unc.edu/undergraduate/departments/division-radiologic-science/>) to the CLS program, students take courses in all the major areas of clinical laboratory science including clinical chemistry, hematology, hemostasis, microbiology, transfusion medicine, and transplantation medicine. Senior students rotate through the clinical laboratories at UNC Hospitals and other laboratories in the state. They also take advanced courses in the clinical laboratory sciences. Honors contracts are available for students in the Honors program.

Code	Title	Hours
Core Requirements		
CLSC 410	Laboratory Mathematics	1
CLSC 410L	Basic and Molecular Laboratory Methods	2
CLSC 420	Urinalysis and Body Fluids	1
CLSC 420L	Urinalysis Laboratory	1
CLSC 430	Biochemistry	3
CLSC 440	Hematology I	2
CLSC 440L	Hematology I Laboratory	1
CLSC 442	Hematology II	3
CLSC 442L	Hematology II Laboratory	1
CLSC 450	Immunology	3
CLSC 460	Special Pathogens	2
CLSC 460L	Parasitology and Mycology Laboratory	1
CLSC 462	Clinical Bacteriology	3
CLSC 462L	Clinical Bacteriology Laboratory	2
CLSC 470	Clinical Chemistry	3
CLSC 470L	Clinical Chemistry Laboratory	2
CLSC 480	Immunochemistry	3
CLSC 480L	Immunochemistry Laboratory	2
CLSC 540L	Clinical Hematology Laboratory	4
CLSC 542L	Clinical Hemostasis Laboratory	2
CLSC 550L	Clinical Immunology Laboratory	1
CLSC 560L	Clinical Microbiology Laboratory	4
CLSC 570L	Clinical Chemistry Laboratory Rotation	4
CLSC 580L	Clinical Immunochemistry Laboratory	4
CLSC 582L	Clinical Transplantation Medicine Laboratory	1
CLSC 620	Clinical Laboratory Management	2
CLSC 630	Research Methods in Clinical Laboratory Science	2
CLSC 670	Clinical Laboratory Science Educational Methods	2
Total Hours		62

Sample Plan of Study

Sample plans can be used as a guide to identify the courses required to complete the major and other requirements needed for degree completion within the expected eight semesters. The actual degree plan may differ depending on the course of study selected (second major, minor, etc.). Students should meet with their academic advisor to create a degree plan that is specific and unique to their interests. The sample plans represented in this catalog are intended for first-year students entering UNC–Chapel Hill in the fall term. Some courses may not be offered every term.

In the first and sophomore years, clinical laboratory science majors satisfy General Education requirements and take a basic science curriculum comparable to that of other science students. In the sophomore year, students apply for admission (<http://catalog.unc.edu/undergraduate/departments/division-clinical-laboratory-science/>) into the final two years of the program. Students in the UNC–Chapel Hill General College are required to satisfy all Foundations and Approaches requirements and take at least five Connections courses, including global issues, experiential education, and U.S. diversity courses.

The junior year includes courses that cover the principal areas of clinical laboratory science. Students also learn and practice laboratory techniques in a student laboratory. Senior students rotate through the clinical laboratories at UNC Hospitals and other laboratories in the state. They also take advanced courses in the clinical laboratory sciences.

The suggested course sequence for the required preclinical laboratory science courses at UNC–Chapel Hill is listed below. Transfer students receiving placement credit may have a slightly different sequence.

First Year	Hours
Fall Semester	
CHEM 101 & 101L General Descriptive Chemistry I and Quantitative Chemistry Laboratory I (C- or better required)	4
ENGL 105 English Composition and Rhetoric	3
Foreign language level 1	3
One of the following:	3
MATH 130 Precalculus Mathematics	
MATH 231 Calculus of Functions of One Variable I ^H	
STOR 151 Introduction to Data Analysis	
Lifetime fitness	1
Approaches (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/) course	3
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Hours	17
Spring Semester	
BIOL 101 & 101L Principles of Biology and Introductory Biology Laboratory ^H	4
CHEM 102 & 102L General Descriptive Chemistry II and Quantitative Chemistry Laboratory II ^H	4
Foreign language level 2	3
Approaches (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/)/Connections (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/) course	3
Approaches (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/)/Connections (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/) course	3
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Hours	17
Sophomore Year	
Fall Semester	
CHEM 241 & 241L Modern Analytical Methods for Separation and Characterization and Laboratory in Separations and Analytical Characterization of Organic and Biological Compounds ^H	3

CHEM 261 is not required but is recommended for students who have time in their schedules for additional science courses.	
Foreign language level 3	3
Approaches (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/) and Connections (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/) courses	6

Hours	12
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Spring Semester

BIOL — Biology course (BIOL 202 strongly recommended)	4
BIOL 252 is not required but is recommended for students who have time in their schedules for additional science courses.	
Remaining Approaches (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/) and Connections (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/) courses	9

Hours	13
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Junior Year

Fall Semester

CLSC 410 Laboratory Mathematics & 410L and Basic and Molecular Laboratory Methods	3
CLSC 420 Urinalysis and Body Fluids & 420L and Urinalysis Laboratory	2
CLSC 430 Biochemistry	3
CLSC 440 Hematology I & 440L and Hematology I Laboratory	3
CLSC 450 Immunology	3

Hours	14
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Spring Semester

CLSC 442 Hematology II & 442L and Hematology II Laboratory	4
CLSC 462 Clinical Bacteriology & 462L and Clinical Bacteriology Laboratory	5
CLSC 470 Clinical Chemistry & 470L and Clinical Chemistry Laboratory	5
CLSC 480 Immunohematology & 480L and Immunohematology Laboratory	5

Hours	19
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Senior Year

Clinical Education: Senior clinical education takes place in UNC Hospitals' laboratories and other clinical laboratories in North Carolina. These laboratories are highly regarded in the field of laboratory medicine, and students have the opportunity to learn the most recent techniques in clinical laboratory science.

Courses taken during fall or spring semester:

CLSC 460 Special Pathogens	2
CLSC 460L Parasitology and Mycology Laboratory	1
CLSC 540L Clinical Hematology Laboratory	4
CLSC 542L Clinical Hemostasis Laboratory	2
CLSC 550L Clinical Immunology Laboratory	1
CLSC 560L Clinical Microbiology Laboratory	4
CLSC 570L Clinical Chemistry Laboratory Rotation	4
CLSC 580L Clinical Immunohematology Laboratory	4
CLSC 582L Clinical Transplantation Medicine Laboratory	1
CLSC 620 Clinical Laboratory Management	2

CLSC 630 Research Methods in Clinical Laboratory Science	2
CLSC 670 Clinical Laboratory Science Educational Methods	2
Hours	29
Total Hours	121

H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

Special Opportunities in Clinical Laboratory Science

Departmental Involvement

Student ambassadors in the Department of Allied Health Sciences organize students' professional activities and social events. The CLS Service Society provides opportunities for students to work together to promote the CLS profession and provide services to the community.

Experiential Education

Senior clinical courses provide a range of clinical laboratory experience in chemistry, hematology, hemostasis, microbiology, transfusion medicine, immunology, histocompatibility, and molecular testing.

Certification

Upon successful completion of the clinical laboratory science curriculum, graduates receive the B.S. degree with a major in clinical laboratory science. A certificate also is awarded by the Division of Clinical Laboratory Science and the Department of Allied Health Sciences. Graduates of the program are eligible to take the national certification examination in medical laboratory science.

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, 60018-5119, (773) 714-8880, www.naacls.org (<http://www.naacls.org>).

Undergraduate Awards

Louise Ward Scholarships: Three scholarships are awarded to clinical laboratory science students each year based on academic excellence, potential for success as a clinical laboratory science student and practitioner, and financial need.

Additional scholarships available to clinical laboratory science students include

- The Lanning-Taylor Scholarship, awarded to a senior clinical laboratory science student
- The Raleigh Pathology Laboratory Associates Scholarship, awarded to a junior or a senior student
- The WakeMed Health and Hospital Annual CLS Scholarship, awarded to a junior or senior student
- The Allene W. Alphin and Jesse C. Alphin Scholarships, awarded to two clinical laboratory science students

Outstanding CLS Student: Each year a clinical laboratory science senior is named as the outstanding student based on nominations from clinical and academic faculty members.