

Medical Laboratory Science (MLS)

B.S. in Medical Laboratory Science (<https://catalog.und.edu/undergraduateacademicinformation/departmentalcoursesprograms/medicalaboratoryscience/mls-bs/>)

Certificate in Medical Laboratory Science (<https://catalog.und.edu/undergraduateacademicinformation/departmentalcoursesprograms/medicalaboratoryscience/mls-cert/>)

Four Year Plan - B.S. in Medical Laboratory Science (p. 1)

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Freshman Year

Fall		Credits
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
ENGL 110	College Composition I	3
MATH 103 or MATH 107 or MATH 146 or MATH 165	College Algebra or Precalculus or Applied Calculus I or Calculus I	3
Credits		14

Spring

BIOL 151	General Biology II	3
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1
COMM 110	Fundamentals of Public Speaking	3
ENGL 130	Composition II: Writing for Public Audiences	3
MLS 110	Introduction to Medical Laboratory Science	2
Credits		15

Sophomore Year

Fall		Credits
BIMD 220	Human Anatomy Physiology I	3
MLS 226	Introduction to Clinical Immunology	3
PSYC 111	Introduction to Psychology (Recommended)	3
SOC 110	Introduction to Sociology (Recommended)	3
ES Elective (Fine Arts/Humanities)		3
Credits		15

Spring

BIMD 221	Human Anatomy Physiology II	3
MLS 220	Introduction to Clinical Laboratory Operations	2
PHE 101	Introduction to Public Health (Recommended)	3
SOC 326 or PSYC 241 or ECON 210	Sociological Statistics or Statistics for the Behavioral Sciences or Introduction to Business and Economic Statistics	3
Science Elective *		3
MLS 340	Introduction to Molecular Diagnostics	1
Credits		15

Junior Year

Fall		Credits
MLS 332	Introduction to Clinical Hematology	3
MLS 339	Introduction to Evidence Based Practice (ES Elective)	3
ES Elective (Fine Arts/Humanities)		3

Science Elective *		3
Credits		12

Spring

BIMD 301	Biochemistry	3
MLS 334	Introduction to Clinical Microbiology	3
ES Elective (Fine Arts/Humanities)		3
ES Elective (Analyzing Worldview)		3
Credits		12

Professional Year 1

Summer

MLS 411	Clinical Chemistry I	2
MLS 412	Clinical Hematology Hemostasis I	3
MLS 413	Clinical Immunohematology I	2
MLS 414	Clinical Microbiology I	3
MLS 415	Clinical Urinalysis Body Fluids I	2
MLS 416	Clinical Immunology Molecular Diagnostics	1

Credits 13

Fall

MLS 420	Clinical Laboratory Operations	2
MLS 421	Clinical Chemistry II	2
MLS 422	Clinical Hematology Hemostasis II	3
MLS 423	Clinical Immunohematology II	2
MLS 424	Clinical Microbiology II	3
MLS 425	Clinical Urinalysis Body Fluids II	2

Credits 14

Spring

MLS 431	Clinical Chemistry Urinalysis III	1-2
MLS 432	Clinical Hematology Hemostasis III	1-2
MLS 433	Clinical Immunohematology III	2
MLS 434	Clinical Microbiology III	2
MLS 449	Capstone in Medical Laboratory Science	3
MLS 450	Advanced Clinical Applications in Medical Laboratory Science	1

Credits 10-12

Total Credits 120-122

* *Microbiology, Organic Chemistry, Analytical Chemistry, Molecular Biology, Cell Biology, Genetics, or other advisor-approved basic science course; Note: if taking BIMB 301 from UND, one Science Elective must be CHEM 340/L*

Students must complete enough electives to bring total credit hours up to at least 120. Please Note: Every student must fulfill all University, Departmental, and Essential Studies requirements. (<https://und.edu/academics/essential-studies/>)

MLS 110. Introduction to Medical Laboratory Science. 2 Credits.

Introduction to the professional role, fundamental knowledge, and clinical skills related to medical laboratory science. S.

MLS 220. Introduction to Clinical Laboratory Operations. 2 Credits.

Foundational principles and practice of clinical laboratory operations. Prerequisite: Pre-MLS, Certificate, or Bachelor's in MLS students only. F,S,SS.

MLS 226. Introduction to Clinical Immunology. 3 Credits.

Foundational principles and practice in clinical immunology. Prerequisite: Pre-MLS, Certificate, or Bachelor's in MLS students only. F,S,SS.

MLS 234. Human Parasitology. 2 Credits.

Physiological aspects of human parasites, their symbiotic host parasite relationships and clinical diagnostic techniques. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F,S,SS.

MLS 234L. Human Parasitology Laboratory. 1 Credit.

Laboratory methods for the identification and diagnosis of human parasites. Prerequisite: MLS, Categorical Certificate Clinical Chemistry/Urinalysis, Categorical Certificate Hematology/Hemostasis, Categorical Certificate Immunohematology or Categorical Certificate Microbiology students only. F.

MLS 301. Immunology. 3 Credits.

Principles of clinical immunology focusing on the cellular and molecular nature of antigens and immunoglobulin, the immune response, immunogenetics, and immune mediated disease. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 325. Hematology. 3 Credits.

Identification of normal and abnormal blood cells in various hematological disorders. Theory and application of hematology procedures. Theory and mechanisms of hemostasis. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 325L. Hematology Laboratory. 2 Credits.

Morphologic examination of blood and bone marrow and laboratory testing used in hematological study. F,S,SS.

MLS 332. Introduction to Clinical Hematology. 3 Credits.

Foundational principles and practice in clinical hematology and hemostasis. Prerequisite: Pre-MLS, Certificate, or Bachelor's in MLS students only. F,S,SS.

MLS 334. Introduction to Clinical Microbiology. 3 Credits.

Foundational principles and practice in clinical microbiology (including mycology, parasitology, and virology). Prerequisite: Pre-MLS, Certificate, or Bachelor's in MLS students only. S.

MLS 336. Laboratory Calculations. 1 Credit.

Calculations used in the clinical laboratory including measurement systems, dilutions, graphing, solution chemistry, statistics of quality control and research interpretation. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 339. Introduction to Evidence Based Practice. 3 Credits.

Foundational principles of evidence-based practice in the health sciences. The course focuses on identifying and evaluating common discipline-related evidence sources, as well as utilization of appropriate evidence to support relevant practice-related decisions. Prerequisite: Pre-MLS, MLS program, and Bachelor of General Studies (Histotechnology subplan) students only. F,S.

MLS 340. Introduction to Molecular Diagnostics. 1 Credit.

Foundational principles and practice of molecular diagnostics. Prerequisite: MLS program students only. S.

MLS 340L. Molecular Diagnostics Laboratory. 1 Credit.

Application of molecular techniques including the operation of molecular based instrumentation, DNA extraction and measurement, blotting, polymerase chain reactions, and utilization of probes. Prerequisite: MLS program students only. S.

MLS 380. Professional Issues in Clinical Laboratory Science. 1 Credit.

Discussion of CLS professional issues, ethics, current topics of healthcare delivery, governmental regulations, societal concerns, cultural diversity, disease prevention, research and environment. Prerequisite: MLS Program Students Only. SS.

MLS 394. Medical Microbiology. 2 Credits.

Medically important microorganisms are identified using a wide variety of clinical techniques. Included in the discussion will be susceptibility studies and the correlation of the presence of microorganisms to health and disease. Prerequisite: MLS, Categorical Certificate Clinical Chemistry/Urinalysis, Categorical Certificate Hematology/Hemostasis, Categorical Certificate Immunohematology or Categorical Certificate Microbiology students only. S.

MLS 399. Special Topics in Clinical Laboratory Science. 1-13 Credits.

Lecture, discussion, and readings on topics of current interest in the clinical laboratory sciences. Prerequisite: MLS Program Students Only. Repeatable to 13.00 credits. F,S,SS.

MLS 411. Clinical Chemistry I. 2 Credits.

Theory in clinical chemistry focused on physiologic mechanisms, preanalytic testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. SS.

MLS 412. Clinical Hematology & Hemostasis I. 3 Credits.

Theory in clinical hematology and hemostasis focused on physiologic mechanisms, preanalytic testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. SS.

MLS 413. Clinical Immunohematology I. 2 Credits.

Theory in clinical immunohematology focused on physiologic mechanisms, preanalytic testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. SS.

MLS 414. Clinical Microbiology I. 3 Credits.

Theory in clinical microbiology (including mycology, parasitology, and virology) focused on physiologic mechanisms, preanalytic testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. SS.

MLS 415. Clinical Urinalysis & Body Fluids I. 2 Credits.

Theory in clinical urinalysis and body fluids focused on physiologic mechanisms, preanalytic testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. SS.

MLS 416. Clinical Immunology & Molecular Diagnostics. 1 Credit.

Theory in clinical immunology and molecular diagnostics focused on physiologic mechanisms, preanalytic testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. SS.

MLS 420. Clinical Laboratory Operations. 2 Credits.

Theory and practice related to clinical laboratory operations, including essential technical skills and professionalism. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 421. Clinical Chemistry II. 2 Credits.

Advanced theory and practice in clinical chemistry focused on analytical testing, relevant pathophysiology, clinical correlations, and post-analytic considerations. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 422. Clinical Hematology & Hemostasis II. 3 Credits.

Advanced theory and practice in clinical hematology and hemostasis focused on analytical testing, relevant pathophysiology, clinical correlations, and post-analytic considerations. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 423. Clinical Immunohematology II. 2 Credits.

Advanced theory and practice in clinical immunohematology focused on analytical testing, relevant pathophysiology, clinical correlations, and post-analytic considerations. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 424. Clinical Microbiology II. 3 Credits.

Advanced theory and practice in clinical microbiology (including mycology, parasitology, and virology) focused on analytical testing, relevant pathophysiology, clinical correlations, and post-analytic considerations. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 425. Clinical Urinalysis & Body Fluids II. 2 Credits.

Advanced theory and practice in clinical urinalysis and body fluids focused on analytical testing, relevant pathophysiology, clinical correlations, and post-analytic considerations. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 430. Clinical MLS Theory I. 3 Credits.

Theory in clinical chemistry, hematology, hemostasis, urinalysis, and body fluids. Focused on physiologic mechanisms, preanalytical testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. S/U grading. F.

MLS 431. Clinical Chemistry & Urinalysis III. 1-2 Credits.

Supervised clinical experience at an affiliated laboratory site. Focused on advanced clinical, professional, and theory-application skills required for entry-level competency in clinical chemistry urinalysis. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 432. Clinical Hematology & Hemostasis III. 1-2 Credits.

Supervised clinical experience at an affiliated laboratory site. Focused on advanced clinical, professional, and theory-application skills required for entry-level competency in clinical hematology hemostasis. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 433. Clinical Immunohematology III. 2 Credits.

Supervised clinical experience at an affiliated laboratory site. Focused on advanced clinical, professional, and theory-application skills required for entry-level competency in clinical immunohematology. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 434. Clinical Microbiology III. 2 Credits.

Supervised clinical experience at an affiliated laboratory site. Focused on advanced clinical, professional, and theory-application skills required for entry-level competency in clinical microbiology. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 439. Clinical MLS Practicum. 5 Credits.

Supervised clinical experience at an affiliated laboratory site. Focused on advanced clinical, professional, and theory-application skills required for entry-level competency in clinical chemistry, hematology, hemostasis, urinalysis, body fluids, microbiology (including mycology, parasitology, and virology), immunohematology, immunology, and molecular diagnostics. Prerequisite: Certificate or Bachelor's of MLS students only. F,S,SS.

MLS 440. Clinical MLS Theory II. 3 Credits.

Theory in clinical microbiology (including mycology, parasitology, and virology) and immunohematology. Focused on physiologic mechanisms, preanalytical testing considerations, analytical testing principles/procedures, and general clinical correlations. Prerequisite: Certificate or Bachelor's in MLS students only. S/U grading. F,S,SS.

MLS 449. Capstone in Medical Laboratory Science. 3 Credits.

A capstone course focused on professional development, laboratory management, evidence-based practice/scholarly writing, and understanding the role of the medical laboratory in healthcare. Prerequisite: Enrollment in clinical practicum coursework is the corequisite; MLS program students only. F,S,SS.

MLS 450. Advanced Clinical Applications in Medical Laboratory Science. 1 Credit.

A culminating course focused on preparation for entry-level professional practice as a laboratory scientist, integration of advanced clinical theory and skills, and interdisciplinary applications. Prerequisite: Certificate or Bachelor's in MLS students only. F,S,SS.

MLS 460. Laboratory Practice. 2 Credits.

This course represents an overview of standard laboratory practices including safety, glassware, microscopes, centrifuges, balances, specimen collection and handling. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F,S,SS.

MLS 464. Clinical Review. 3 Credits.

Emphasis is on concepts related to the role of a clinical laboratory scientist. Analysis and evaluation focuses on the theories of immunohematology, clinical chemistry, microbiology, hematology and other areas contributing to clinical application. F.

MLS 465. Clinical Laboratory Management. 3 Credits.

Management practices in the clinical laboratory including concepts related to service and quality, information management, financial management, personnel management, laboratory education and research. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F,S,SS.

MLS 471. Clinical Chemistry I. 2 Credits.

Theories and principles of clinical chemistry procedures are discussed as well as how the results of these procedures correlate to health and disease. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. SS.

MLS 472. Pre-analytical Skills. 1 Credit.

Theory and practice of phlebotomy in the clinical setting, specimen processing, review of state and federal regulations, safety and biohazard compliance, interpersonal relationship skills. Prerequisite: MLS Program Students Only. SS.

MLS 473. Clinical Hemostasis I. 2 Credits.

Physiologic mechanisms of normal human hemostasis as well as hereditary and acquired defects. Laboratory techniques performed and discussed are screening tests and specific assays for abnormalities, procedures to monitor therapeutic measures and practice and maintenance of current instrumentation. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. SS.

MLS 474. Clinical Urinalysis I. 2 Credits.

Theory, techniques and practice of microscopy and urinalysis with emphasis on identification of elements in the sediment. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. SS.

MLS 477. Clinical Immunohematology I. 1 Credit.

Theory of modern transfusion techniques, component therapy, and quality assurance. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. SS.

MLS 477L. Clinical Immunohematology I Lab. 1 Credit.

Practical application of modern transfusion techniques, component therapy, and quality assurance. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. SS.

MLS 478. Clinical Microbiology I. 2 Credits.

Groups of medically important bacteria are studied and correlated to laboratory practice in identification. Included in the discussions are antibiotic susceptibility testing, quality control, and methods of identification including rapid, automated, and traditional methods. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. SS.

MLS 479. Clinical Hematology I. 2 Credits.

Emphasis on interpretive correlation of hematology findings and pathophysiology. Topics of current interest and advances in hematology. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. SS.

MLS 480. Clinical Immunohematology II. 2 Credits.

Applied theory and modern transfusion at the clinical affiliate. Offered annually. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only.

MLS 481. Clinical Chemistry II. 2 Credits.

Applied theory and practice in clinical chemistry at the clinical affiliate. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 483. Clinical Hemostasis II. 1 Credit.

Techniques and practice in routine phlebotomy and hemostasis at the clinical affiliate. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 484. Clinical Microbiology II. 2 Credits.

Applied theory and practice in clinical microbiology at the clinical affiliate. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 485. Clinical Urinalysis II. 1 Credit.

Applied theory and practice in urinalysis and observation, practice, or research in specialized areas or settings at the clinical affiliate. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 487. Medical Mycology. 1 Credit.

Comparative morphology, physiology and pathogenicity of medically important fungi. Laboratory methods for identification emphasize interpretation and evaluation of results including the recognition of contaminating organisms. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 488. Clinical Hematology II. 2 Credits.

Applied theory and practice in clinical hematology at the clinical affiliate. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 489. Clinical Body Fluids. 1 Credit.

Overview of the theory and practice in manual procedures of human body fluids. The body fluids to be discussed include: spinal, synovial and amniotic fluid, transudates and exudates, fecal specimens, gastric, sweat, and other body fluid secretions. Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. F.

MLS 491. Clinical Chemistry III. 2 Credits.

Techniques and practice in clinical chemistry at the clinical affiliate.

Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. S.

MLS 492. Clinical Immunohematology III. 2 Credits.

Techniques and modern transfusion practices at the clinical affiliate.

Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. S.

MLS 494. Clinical Immunology. 1 Credit.

Applied theory and practice in clinical immunology and serology at the clinical affiliate. Prerequisite: MLS, Categorical Certificate Clinical Chemistry/Urinalysis, Categorical Certificate Hematology/Hemostasis, Categorical Certificate Immunohematology or Categorical Certificate Microbiology students only. S.

MLS 495. Clinical Microbiology III. 2 Credits.

Techniques and practice in clinical microbiology at the clinical affiliate.

Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. S.

MLS 498. Clinical Hematology III. 2 Credits.

Techniques and modern hematology practices at the clinical affiliate.

Prerequisite: MLS, Clinical Chemistry/Urinalysis, Hematology/Hemostasis, Immunohematology or Microbiology program students only. S.