

Medical Laboratory Science (MLS)

<http://med.und.edu/mls>

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The Department of Medical Laboratory Science at the University of North Dakota has offered a degree in medical laboratory science (formerly clinical laboratory science) since 1949. The Medical Laboratory Science (MLS) program is accredited by the National Accrediting Agency for Medical Laboratory Sciences (NAACLS), which is located at 5600 N. River Road, Suite 720, Rosemont, IL 60018-5119.

Medical Laboratory Scientists, sometimes referred to as medical technologists or clinical laboratory scientists, are key members of the health care team. They are concerned with the study and practice of diagnostic medicine and generate accurate and reliable test results in chemistry, hematology, immunology, immunochemistry and microbiology. The results provide valuable information used in the diagnosis and treatment of disease. Excellent employment opportunities exist not only in hospitals and clinics, but also in physician offices, government agencies, industry, research, the armed forces and health related facilities. A workforce shortage of medical laboratory scientists exists and has generated a large demand for new graduates. In addition to immediate employment opportunities, many graduates attend medical school or pursue graduate degrees in medical laboratory science, management or education.

B.S. in Medical Laboratory Science (2+2 Track)

Students complete a pre-professional curriculum (pre-MLS) at UND. The pre-professional curriculum includes approximately four semesters of specific preparatory coursework for admission into the professional (BS MLS) curriculum. The professional program (BS MLS) is approximately five semesters in length and includes two semesters of preparatory coursework and three semesters in the final clinical year. The final clinical year of the professional curriculum is 37 credits and includes a 12-week on-campus experience in the summer semester, online coursework, and a clinical affiliation experience. Upon successful completion of all courses, the student receives a BS in MLS degree from the University of North Dakota and is eligible to complete the national certification exam.

Application for advancement to the professional education component is made directly following the second semester of the sophomore year. Applicants to the professional program must have a cumulative GPA of 2.8 and no more than one D in any math or science course. Exceptions for acceptance and continuance may be made by petition to the Department of Medical Laboratory Science Professional and Academic Standards Committee. During the second year of the professional curriculum (senior year), students register for courses in the summer, fall and spring semesters.

When a student is registered in 300 and 400 level MLS courses a specific MLS tuition is assessed.

Articulation Program

Clinical Laboratory Technician (CLT) or Medical Laboratory Technician (MLT) graduates are encouraged to apply to the UND MLS program to earn a BS in MLS. A CLT/MLT graduate will be eligible for the transfer of up to 60 semester credits depending on the curriculum completed. Transfer credits allow the waiver of several science courses in the professional curriculum. The student's record is evaluated and a recommendation is made to the Registrar regarding the number of credits to be transferred and the science courses to be waived. The student may be eligible for a shortened professional program based on previous coursework, years of experience working in a clinical laboratory, and a competency assessment. A specific outline for the number of credits that will transfer has been incorporated into articulation agreements with numerous regional technical and community colleges. Contact the MLS program for additional information.

When a student is registered in 300 and 400 level MLS courses, a specific MLS tuition is assessed.

Western College Alliance for Medical Laboratory Science (WCAMLS) Education (3+1 Track)

The Medical Laboratory Science program is affiliated with Bemidji State University, Bemidji, MN; Jamestown College, Jamestown, ND; Mayville State University, Mayville, ND; Minot State University, Minot, ND; Valley City State University, Valley City, ND; Montana State University, Billings, MT; Northern State University, Aberdeen, SD; St. Cloud State University, St. Cloud, MN; University of Mary, Bismarck, ND; University of Minnesota-Crookston, Crookston, MN; University of South Dakota, Vermillion, SD; University of Wisconsin-La Crosse; and Winona State University, Winona, MN. The program of study for the first three years at these colleges is aligned with the UND MLS program. Students from these institutions apply to the UND MLS program for their final year of study. Upon completion of the final year, the student receives a certificate from the University of North Dakota verifying completion of 12 months of clinical training in the UND NAACLS accredited program. The student is then eligible for a degree in Medical Laboratory Science, a related major, or a certificate from their respective institution and eligibility to complete the national certification exam.

B.S. Degree Including 4+1 and WCAMLS Students-General Information

Professional Curriculum Year 2

A summer practicum experience on the UND campus in Grand Forks, ND is required, followed by approximately seven months (fall and spring semesters) in a clinical laboratory of a medical center. There are special requirements prior to contact with patients and testing of patient specimens. A background check, specific immunizations and antibody titers are required by all clinical affiliates prior to working with patients. Students are responsible for additional costs that include: travel, housing, and food.

The program has clinical affiliation agreements with over 70 medical centers in Arizona, Colorado, Iowa, Minnesota, Montana, North Dakota, Oregon, South Dakota, Wisconsin and Wyoming for the clinical experience. A complete list and description of the current clinical sites is available at <http://med.und.edu/mls>.

Online Courses

There are many courses offered by the MLS program through online or distance learning. The primary method of distance learning course delivery is web-based. Eligibility for distance and online courses can be determined by contacting the MLS office. Students participating in online coursework are required to have Internet access. Specific computer requirements are available from the MLS office.

The Medical Laboratory Science program is within the Department of Medical Laboratory Science.

School of Medicine and Health Sciences B.S. in Medical Laboratory Science

The Medical Laboratory Science (MLS) courses are listed.

Required: 126 credits (36 of which must be numbered 300 or above, and 60 credits of which must be from a four-year institution) including:

I. Essential Studies Requirements (see University ES listing).

II. MLS Curriculum Requirements:

Freshman Year		Credits
First Semester		
ENGL 110	College Composition I	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4

MATH 103	College Algebra	3
	Credits	14
Second Semester		
COMM 110	Fundamentals of Public Speaking	3
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
ENGL 130	Composition II: Writing for Public Audiences	3
BIOL 151	General Biology II	3
Arts & Humanities Elective (Global Diversity Category)		3
	Credits	16
Sophomore Year		
First Semester		
ANAT 204	Anatomy for Paramedical Personnel	3
MLS 101	Orientation to Medical Laboratory Sciences	2
COMM 212	Interpersonal Communication	3
MBIO 202	Introductory Medical Microbiology Lecture	3
Soc Sci Elective (Introduction to Psychology Recommended)		3
	Credits	14
Second Semester		
CHEM 340 & 340L	Survey of Organic Chemistry and Survey of Organic Chemistry Laboratory	5
MLS 234	Human Parasitology	2
MLS 234L	Human Parasitology Laboratory	1
PPT 301	Human Physiology	4
Soc Sci Elective (US Diversity Category)		3
	Credits	15
Junior Year		
First Semester		
Professional Curriculum Year 1		
MLS 301	Immunology	3
MLS 325	Hematology	3
MLS 325L	Hematology Laboratory	2
MLS 336	Laboratory Calculations	1
Soc Sci Elect (Introduction to Sociology Recommended)		3
Arts & Humanities Elective (Fine Arts Category)		3
	Credits	15
Second Semester		
MLS 340	Molecular Diagnostics	2
MLS 340L	Molecular Diagnostics Laboratory	1
MLS 380	Professional Issues in Clinical Laboratory Science	1
MLS 394	Medical Microbiology	2
BMB 301	Biochemistry	3
MGMT 300	Principles of Management	3
Arts & Humanities (Humanities Category)		3
	Credits	15
Senior Year		
First Semester		
Professional Curriculum Year 2		
	Credits	0
Summer		
MLS 471	Clinical Chemistry I	2
MLS 472	Pre-analytical Skills	1
MLS 473	Clinical Hemostasis I	2
MLS 474	Clinical Urinalysis I	2
MLS 477	Clinical Immunohematology I	1
MLS 477L	Clinical Immunohematology I Lab	1
MLS 478	Clinical Microbiology I	2
MLS 479	Clinical Hematology I	2
	Credits	13
Fall		
MLS 480	Clinical Immunohematology II	2
MLS 481	Clinical Chemistry II	2

MLS 483	Clinical Hemostasis II	1
MLS 484	Clinical Microbiology II	2
MLS 485	Clinical Urinalysis II	1
MLS 487	Medical Mycology	1
MLS 488	Clinical Hematology II	2
MLS 489	Clinical Body Fluids	1
	Credits	12
Spring		
MLS 490	Financial and Quality Management of the Clinical Laboratory	3
MLS 491	Clinical Chemistry III	2
MLS 492	Clinical Immunohematology III	2
MLS 494	Clinical Immunology	1
MLS 495	Clinical Microbiology III	2
MLS 498	Clinical Hematology III	2
	Credits	12
	Total Credits	126

Certificate in Medical Laboratory Science Program (4+1 Track)

Students enrolled in the certificate program (4+1 track) have earned a baccalaureate degree from a regionally accredited college or university. Prior to entering the final clinical year of the professional program, the student must complete specific prerequisite courses. The final clinical year is the same as the traditional (2+2 track) and the Western College Alliance (3+1 track) student experience. The 4+1 student earns a certificate in Medical Laboratory Science from the University of North Dakota upon successful completion of all courses and is eligible to complete the national certification exam. If a student wishes to earn a second baccalaureate degree in Medical Laboratory Science from the University of North Dakota, the student must also have completed coursework to meet the Essential Studies requirements.

Prerequisite Courses Credits

General Chemistry	8	
Organic Chemistry	3	
Biochemistry	3	
General Biology	6	
Microbiology	3	
Anatomy	3	
Physiology	3	
MLS 234	Human Parasitology *	2
MLS 301	Immunology *	3
MLS 325	Hematology *	3
MLS 325L	Hematology Laboratory **	2
MLS 336	Laboratory Calculations (Recommended) *	1
MLS 340	Molecular Diagnostics *	2
MLS 394	Medical Microbiology (Recommended) *	2
Total Credits	44	

* Available online from the MLS Program

** Offered as an intensive laboratory on campus in May

When a student is registered in 300 and 400 level MLS courses a specific MLS tuition is assessed.

Upon successful completion of the prerequisite coursework, the 4+1 student applies to the second year of the professional program (see BS MLS Professional Curriculum Year 2 previously listed). The applicant must have a cumulative GPA of 2.8, and no more than one D in any math or science course. Exceptions for acceptance and continuance may be made by petitioning the Department of Medical Laboratory Science Professional and Academic Standards Committee.

Upon successful completion of the 4+1 program of study, the student will earn a certificate in MLS from UND and will be eligible to complete the national certification examination and become a certified Medical Laboratory Scientist.

When a student is registered in 300 and 400 level MLS courses, a specific MLS tuition is assessed.

Categorical Certificate Training Program

The Medical Laboratory Science Categorical Certificate Training Program from the University of North Dakota provides advanced skills to baccalaureate prepared students, enabling them to work in high complexity clinical laboratories. The program includes four individual certificate categories: Clinical Chemistry/Urinalysis; Hematology/Hemostasis; Immunohematology; and Microbiology.

Upon successful completion of one categorical category, the student is eligible to complete the ASCP (American Society of Clinical Pathology) national certification exam in the specific categorical area. If the student completes all four categorical categories, the student is eligible to complete the ASCP national certification medical laboratory science (MLS) exam.

Admission Requirements

To be admitted to the UND MLS Categorical Program(s), the student must meet the following requirements:

- Hold a baccalaureate degree from a regionally accredited college or university
- Have a minimum of 20 semester credit hours in the biological, chemical and/or medical sciences (these credits can be part of, or in addition to the B.S. degree)
- Have the support of an accredited medical laboratory to facilitate the student's clinical experience

Clinical Chemistry/Urinalysis

MLS 336	Laboratory Calculations	1
MLS 340	Molecular Diagnostics	2
MLS 460	Laboratory Practice	2
MLS 465	Clinical Laboratory Management	3
MLS 471	Clinical Chemistry I	2
MLS 474	Clinical Urinalysis I	2
MLS 481	Clinical Chemistry II	2
MLS 485	Clinical Urinalysis II	1
MLS 489	Clinical Body Fluids	1
MLS 491	Clinical Chemistry III	2
Total Credits		18

Hematology/Hemostasis

MLS 325	Hematology	3
MLS 325L	Hematology Laboratory	2
MLS 336	Laboratory Calculations	1
MLS 460	Laboratory Practice	2
MLS 465	Clinical Laboratory Management	3
MLS 473	Clinical Hemostasis I	2
MLS 479	Clinical Hematology I	2
MLS 483	Clinical Hemostasis II	1
MLS 488	Clinical Hematology II	2
MLS 489	Clinical Body Fluids	1
MLS 498	Clinical Hematology III	2
Total Credits		21

Immunohematology

MLS 301	Immunology	3
MLS 336	Laboratory Calculations	1
MLS 460	Laboratory Practice	2
MLS 465	Clinical Laboratory Management	3
MLS 473	Clinical Hemostasis I	2

MLS 477	Clinical Immunohematology I	1
MLS 477L	Clinical Immunohematology I Lab	1
MLS 480	Clinical Immunohematology II	2
MLS 492	Clinical Immunohematology III	2
MLS 494	Clinical Immunology	1
Total Credits		18

Microbiology

MLS 234	Human Parasitology	2
MLS 336	Laboratory Calculations	1
MLS 340	Molecular Diagnostics	2
MLS 394	Medical Microbiology	2
MLS 460	Laboratory Practice	2
MLS 465	Clinical Laboratory Management	3
MLS 478	Clinical Microbiology I	2
MLS 484	Clinical Microbiology II	2
MLS 487	Medical Mycology	1
MLS 495	Clinical Microbiology III	2
Total Credits		19

When a student is registered in 300 and 400 level MLS courses, a specific MLS tuition is assessed.

Courses

MLS 101. Orientation to Medical Laboratory Sciences. 2 Credits.

Introduction to the role, ethics, conduct, certification, education, employment, and fundamental knowledge and skills related to medical laboratory science. F.

MLS 234. Human Parasitology. 2 Credits.

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

MLS 340. Molecular Diagnostics. 2 Credits.

An introduction to specific molecular biology application in the laboratory and a discussion of cell biology, DNA chemistry, genetics, nucleic acid extraction and modification, blotting, polymerase chain reactions, and probes in relation to diagnostic investigations. Prerequisites: 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. Prerequisites: 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. Prerequisites: 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. Prerequisites: 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. Prerequisites: MLS Program Students Only. Repeatable to 13 credits. F,S,SS.

MLS 430. Clinical Practicum I. 12 Credits.

Applied theory and practice at the clinical affiliate. S/U grading. F.

MLS 440. Clinical Practicum II. 12 Credits.

Techniques and practice in the clinical affiliate. S/U grading. S.

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

MLS 490. Financial and Quality Management of the Clinical Laboratory. 3 Credits.

A capstone course designed to provide senior students with the skills to manage a clinical laboratory. The course brings together previous content with a focus on laboratory profitability, quality management, and quality improvement. Offered annually. Prerequisites: Enrollment in clinical practicum coursework is the corequisite; MLS program students only. S.

MLS 491. Clinical Chemistry III. 2 Credits.

Techniques and practice in clinical chemistry at the clinical affiliate. Prerequisites: 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.

Prerequisites: 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. Prerequisites: 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.

Prerequisites: 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.

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