# Medical Laboratory Science

# Master of Science Degree Courses Core Courses

**MLS 5510 - Phlebotomy Practicum**

Introduction to the theory and procedures for the practice of phlebotomy and simple laboratory testing. Part of the Medical Laboratory Science Core Curriculum, also suited for other health care providers. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5510 Course Outcomes

Cognitive Domain (Knowledge)

1. Explain the role of specimen collection in the overall process of patient care and laboratory testing.

2. Relate anatomy and physiology of body systems to specimen collection procedures and associated pathologic conditions.

3. Identify and describe appropriate equipment, supplies, and additives used in venipuncture and capillary collection.

4. Recognize factors that influence specimen integrity, test results, and patient outcomes.

5. Summarize quality assurance and quality control measures related to specimen collection and handling.

6. Interpret requisitions and describe the legal and ethical implications of phlebotomy practice.

Psychomotor Domain (Skills)

7. Perform venipuncture and capillary puncture procedures on adult, pediatric, and infant patients using proper technique.

8. Prepare the collection site using infection control and safety procedures.

9. Select appropriate collection tools, tubes, and additives for ordered tests.

10. Collect, label, transport, and process specimens according to established protocols.

11. Apply appropriate actions within predetermined limits when errors, complications, or unexpected results occur.

12. Demonstrate correct procedures for point-of-care testing and specimen handling.

Affective Domain (Attitudes/Behaviors)

13. Exhibit professional conduct, including dependability, integrity, and respect for patients and colleagues.

14. Demonstrate effective interpersonal and communication skills with patients, peers, and health care personnel.

15. Manage stress and maintain composure in clinical and laboratory settings.

16. Respect the roles and responsibilities of other members of the healthcare team.

17. Display accountability for personal learning, including applying basic principles to learn new techniques and procedures.

18. Adhere to ethical standards, institutional policies, and safety regulations at all times.

# MLS 5512 – Urinalysis and Body Fluids

Fundamental principles of urine and body fluid analysis with correlation of laboratory methods and practice. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5512 Course Outcomes

Cognitive Domain (Knowledge and Comprehension)

1. Explain the principles and clinical significance of chemical reactions in urinalysis, including reagent strip components, confirmatory testing, and sources of false positives/negatives.
2. Describe the physical, chemical, and microscopic examination of urine and other body fluids.
3. Interpret urinalysis and body fluid results in relation to disease states and correlate findings with clinical case studies.
4. Identify normal and abnormal formed elements in urine and other body fluids.
5. Explain OSHA and CDC regulations including Bloodborne Pathogens, PPE, hand hygiene, and laboratory safety standards.
6. Describe the principles and components of quality assurance and quality control programs in the urinalysis/body fluids laboratory.

Psychomotor Domain (Skills and Application)

1. Simulate safe handling and disposal of urine and body fluid specimens according to biosafety and OSHA guidelines (via video or image-based simulations).
2. Practice recognizing and differentiating microscopic structures and elements in urine/body fluids using visual case studies and images.
3. Perform accurate calculations related to specimen evaluation and quality control (e.g., WBC counts in CSF, dilution factors).
4. Apply critical thinking to case studies, interpreting lab results and forming logical conclusions in the context of patient symptoms.
5. Navigate laboratory information systems or reporting templates to document and analyze urinalysis findings (if applicable to course technology).

Affective Domain (Professionalism and Attitude)

1. Demonstrate responsibility and professionalism in submitting timely, accurate, and original work.
2. Show respect for confidentiality, patient information, and regulatory compliance in discussion and written assignments.
3. Engage respectfully with peers and the instructor in all online communications and discussions.
4. Exhibit self-motivation and time management in an asynchronous online environment.
5. Value the role of urinalysis and body fluids testing in patient care and public health.

# MLS 5514 - Hematology and Hemostasis

Theoretical and applied aspects of medical hematology and hemostasis with emphasis on recognition and correlation of abnormal laboratory observations with pathological conditions. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program.

**MLS 5514 Course Outcomes**

# Cognitive Domain (Knowledge and Understanding):

# Explain the production, morphology, and function of blood cells (red blood cells, white blood cells, and platelets) in both normal and disease states.

# Identify and describe the microscopic morphology of blood cells in peripheral blood, bone marrow, and various body fluids.

# Analyze common hematologic and hemostatic disorders, including their pathophysiology, clinical manifestations, diagnostic tests, and treatment strategies.

# Apply principles of hemostasis to understand clotting and bleeding disorders, and interpret diagnostic laboratory tests related to these disorders.

# Integrate knowledge of hematologic diseases to form differential diagnoses and evaluate laboratory test results.

# Psychomotor Domain (Skill Simulation and Application):

# Demonstrate proficiency in performing laboratory procedures related to hematology, including preparation and examination of blood smears, bone marrow aspirates, and other relevant specimens.

# Accurately identify and classify blood cells and abnormal cell types using light microscopy.

# Interpret hematology and hemostasis laboratory test results, including complete blood counts (CBC), coagulation profiles, and cell morphology, and correlate them with clinical scenarios.

# Prepare and present clinical case studies related to hematology and hemostasis, including laboratory findings, patient history and possible treatment plans.

# Affective Domain (Attitudes, Professionalism and Ethics):

# Demonstrate professionalism in the laboratory setting, adhering to ethical guidelines, patient confidentiality, and quality assurance practices.

# Exhibit critical thinking and problem-solving skills in analyzing complex hematology cases, and reflect on the clinical and ethical implications of diagnostic and treatment decisions.

# Develop a sense of responsibility for continuous professional development, staying current with advances in hematology and hemostasis through ongoing learning and participation in professional organizations.

# Promote a collaborative and respectful learning environment, working effectively with peers, instructors, and healthcare professionals, and recognizing the value of teamwork in clinical settings.

# MLS 5516 - Medical Microbiology

Study and identification of medically important bacteria, viruses, fungi, chlamydiae, rickettsiae, and parasites as applicable to laboratory and infection control settings. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5516 Course Outcomes

Cognitive Domain (Knowledge-Based Learning Outcomes)

1. Explain the basic principles and clinical relevance of microbiology, mycology, virology, parasitology, and mycobacteriology.
2. Differentiate between types of culture media and explain appropriate usage based on specimen source.
3. Describe standard microbiological techniques, including Gram staining, acid-fast staining, and biochemical identification.
4. Interpret antimicrobial mechanisms and resistance patterns relevant to clinical decision-making.
5. Analyze classification schemes of microorganisms, including bacteria, fungi, viruses, parasites, and mycobacteria.
6. Apply theoretical knowledge in preparation for the ASCP Board of Certification (BOC) exam.

Psychomotor Domain (Skills-Based Learning Outcomes)

1. Recognize and differentiate microscopic morphologies of medically important organisms (via images and case-based interpretation).
2. Simulate basic clinical microbiology workflows such as culture workup and organism identification (case-based or digital simulations).
3. Practice interpreting lab reports, staining results, and susceptibility data in a clinical diagnostic context.
4. Employ critical thinking to resolve laboratory challenges and troubleshoot common microbiological issues.
5. Prepare and deliver a scientific presentation (graduate students only), demonstrating effective communication of technical content.

Affective Domain (Attitudinal/Behavioral Learning Outcomes)

1. Demonstrate professionalism, punctuality, and ethical behavior in all course activities.
2. Exhibit respect for patient confidentiality and cultural diversity in case study discussions.
3. Show initiative and responsibility in independent study and quiz preparation.
4. Participate constructively in class discussions, contributing to a collaborative learning environment.
5. Reflect on the role of the medical laboratory professional in patient care and public health.

# MLS 5518 – Medical Chemistry and Instrumentation

Theoretical and applied aspects of medical chemistry with emphasis on test development, validation, and use in diagnosis and management of pathological conditions. Graduate students will prepare, conduct and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5518 Course Outcomes

Cognitive Domain (Knowledge and Comprehension)

1. Explain fundamental principles of clinical chemistry, including acid-base balance, electrolytes, carbohydrates, enzymes, proteins, and non-protein nitrogen compounds.
2. Interpret laboratory data related to metabolic functions of the liver, kidneys, pancreas, heart, and endocrine systems.
3. Identify analytical techniques such as spectrophotometry, ion-selective electrodes, and chromatography, and discuss their clinical applications.
4. Evaluate quality assurance and quality control parameters in clinical chemistry.
5. Correlate biochemical test results with disease states in a clinical context.
6. Integrate prior learning in organic and biochemistry to explain reactions involved in common laboratory assays.
7. Demonstrate preparation for the clinical chemistry component of the ASCP BOC exam.

Psychomotor Domain (Hands-On Skills and Application)

1. Apply safety protocols and standard precautions when performing or simulating laboratory procedures.
2. Operate or interpret data from laboratory instruments such as spectrophotometers and pH meters (via simulation, instructor demo, or case-based application).
3. Perform clinical chemistry calculations, including dilution factors, anion gap, osmolality, and conversion units.
4. Interpret quality control data and recognize shifts or trends that affect test validity.
5. Analyze case studies to simulate real-world laboratory problem-solving and decision-making.
6. (Graduate students) Create and deliver a professional scientific presentation using primary literature and recent advancements in clinical chemistry.

Affective Domain (Professionalism and Behavioral Attributes)

1. Exhibit ethical behavior and integrity in all course-related activities, including adherence to academic honesty policies.
2. Demonstrate personal accountability by completing quizzes, exams, and assignments on time.
3. Collaborate respectfully with peers in group exercises, discussions, and peer reviews.
4. Recognize the role of the medical laboratory scientist in the interdisciplinary healthcare team and the importance of accurate, timely testing.
5. Display curiosity and self-motivation in the exploration of new developments in clinical chemistry, particularly through research assignments.
6. Respect patient confidentiality and show cultural sensitivity when reviewing clinical case studies.

# MLS 5520 – Medical Immunology

Practical aspects of immunology with emphasis on pathological conditions and laboratory practice. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5520 Course Outcomes

# Cognitive Objectives (Knowledge and Application)

# Describe the components and functions of the innate and adaptive immune systems.

# Explain the mechanisms of antigen-antibody interactions and their applications in diagnostic serology.

# Differentiate between types of immunologic disorders, including autoimmune, hypersensitivity, and immunodeficiency conditions.

# Analyze clinical scenarios and correlate immune system function and dysfunction with laboratory data.

# Evaluate the clinical significance and limitations of immunologic testing methods used in patient diagnosis.

# Interpret immunologic test results, considering pre-analytical, analytical, and post-analytical variables.

# Critically appraise immunology-focused literature to identify current advances relevant to laboratory practice.

# (Graduate students only) Compare and justify the selection of immunoassay analyzers for specific clinical settings.

# Psychomotor Objectives (Skill Simulation and Application)

# Demonstrate proficiency in answering ASCP Board of Certification (BOC)-style questions related to immunology.

# Apply immunology theory to simulated case studies and test result interpretations presented in exams and assignments.

# Navigate and utilize the Moodle2 platform to access course materials, participate in assessments, and complete assignments.

# (Graduate students only) Develop and present a written proposal evaluating immunoassay instrumentation based on clinical and technical criteria.

# Affective Objectives (Professional Behavior and Attitudes)

# Exhibit professionalism through timely submission of assignments, academic honesty, and consistent participation in online course activities.

# Demonstrate responsibility and initiative in managing course workload and accessing digital learning resources.

# Reflect on personal learning goals and challenges through introductory and course-based written activities.

# Recognize the significance of immunology in patient care, diagnostics, and clinical decision- making.

# Value the role of ethical practices in laboratory testing and result interpretation.

# Show respect and professionalism in collaborative learning settings and peer interactions.

# Commit to life-long learning in the evolving field of medical immunology and laboratory medicine.

# MLS 5522 – Basic Concepts Transfusion Medicine

# Practical aspects and theoretical considerations of major blood groups with respect to transfusion therapy. Oral and written project presentation required for graduate credit. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5522 Course Outcomes

Cognitive Domain (Knowledge and Understanding):

1. Explain the basic immunology principles and their application to immunohematology, including antigen-antibody interactions and the principles of blood group systems.
2. Describe the biochemistry and genetic principles underlying the ABO and Rh blood group systems.
3. Analyze the mechanisms and procedures of the direct and indirect antiglobulin tests, antibody identification, and pretransfusion testing.
4. Compare the screening processes for blood donors, including the safety standards and criteria for eligibility.
5. Evaluate the preparation and therapeutic applications of different blood components in clinical settings.
6. Interpret laboratory results and understand their significance in the context of blood transfusion medicine, including compatibility testing and the identification of unexpected antibodies.

Psychomotor Domain (Skill Simulation and Application):

1. Perform laboratory techniques for antibody identification, including the use of antiglobulin tests and blood typing procedures.
2. Demonstrate proficiency in the preparation and handling of blood components, including red blood cells, plasma, platelets, and cryoprecipitate.
3. Execute pretransfusion testing protocols, including compatibility testing and crossmatch procedures, ensuring proper technique and accuracy in results.
4. Use laboratory equipment, reagents, and safety precautions in the preparation of blood products and performance of immunohematology tests.
5. Apply critical thinking to troubleshoot unexpected results or problems encountered during blood group testing and transfusion reactions.
6. Simulate scenarios for antibody identification and pretransfusion testing, demonstrating proper workflow and the ability to interpret complex data.

Affective Domain (Attitudes, Professionalism, and Ethics):

1. Demonstrate professional behavior, including punctuality, responsibility, and integrity in laboratory practices and classroom activities.
2. Appreciate the importance of accurate blood typing, crossmatching, and compatibility testing in preventing adverse transfusion reactions and ensuring patient safety.
3. Communicate effectively with peers and instructors about challenges or difficulties encountered in laboratory exercises and theoretical understanding.
4. Commit to upholding ethical practices in blood banking, including the confidentiality of patient information, adherence to safety standards, and honesty in all academic and laboratory work.
5. Acknowledge the value of ongoing professional development and the role of continuing education in maintaining proficiency in transfusion medicine and immunohematology.
6. Participate in discussions about current trends, challenges, and advancements in transfusion medicine, demonstrating a positive attitude towards lifelong learning in the field.

# MLS 5524- Medical Laboratory Fundamentals

Theory and application of basic techniques and instruments used in all areas of medical laboratories. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5524 Course Outcomes

Cognitive Domain (Knowledge & Understanding):

1. Describe the principles and clinical significance of common laboratory tests in transfusion medicine, microbiology, hematology, and urinalysis/body fluid analysis.
2. Explain the theory, methodology, and interpretation of laboratory procedures including Gram staining, ABO/Rh typing, WBC differentials, and microscopic evaluations.
3. Identify potential sources of error in specimen collection, preparation, and testing, and explain appropriate corrective actions.
4. Demonstrate critical thinking by analyzing laboratory results and correlating them with disease states and clinical scenarios.
5. Evaluate laboratory data to distinguish between normal and abnormal findings in hematologic, microbiologic, and body fluid specimens.

Psychomotor Domain (Skill Simulation and Performance):

1. Perform accurate and efficient laboratory procedures including:
   1. Preparation and staining of peripheral blood smears
   2. White blood cell (WBC) and platelet counts using a hemacytometer
   3. WBC differential counts and platelet estimation
   4. ABO and Rh blood grouping and antibody screening
   5. Gram staining and bacterial cultivation techniques
   6. Microscopic and macroscopic urinalysis and body fluid analysis
2. Operate laboratory equipment safely and according to standard operating procedures (SOPs).
3. Demonstrate correct specimen collection, labeling, and handling procedures, including required number of successful venipunctures.
4. Record and document laboratory results accurately in accordance with laboratory protocols.

Affective Domain (Attitudes, Professionalism and Ethics):

1. Demonstrate punctuality, preparedness, and accountability in all laboratory sessions.
2. Exhibit professional conduct, including respect for patients, peers, instructors, and confidentiality of laboratory data.
3. Adhere to safety protocols and demonstrate responsible handling of biological materials and hazardous reagents.
4. Accept constructive feedback and adjust performance accordingly to improve competency.

# MLS 5531 - Medical Microbiology II

Advanced topics in medical microbiology including application of laboratory techniques to the identification and evaluation of medically important pathogens and correlations with disease states.

## MLS 5531 Course Outcomes

Cognitive Domain (Knowledge-Based Learning Outcomes)

1. Explain the basic principles and clinical relevance of microbiology, mycology, virology, parasitology, and mycobacteriology.
2. Differentiate between types of culture media and explain appropriate usage based on specimen source.
3. Describe standard microbiological techniques, including Gram staining, acid-fast staining, and biochemical identification.
4. Interpret antimicrobial mechanisms and resistance patterns relevant to clinical decision-making.
5. Analyze classification schemes of microorganisms, including bacteria, fungi, viruses, parasites, and mycobacteria.
6. Apply theoretical knowledge in preparation for the ASCP Board of Certification (BOC) exam.

Psychomotor Domain (Skills-Based Learning Outcomes)

1. Recognize and differentiate microscopic morphologies of medically important organisms (via images and case-based interpretation).
2. Simulate basic clinical microbiology workflows such as culture workup and organism identification (case-based or digital simulations).
3. Practice interpreting lab reports, staining results, and susceptibility data in a clinical diagnostic context.
4. Employ critical thinking to resolve laboratory challenges and troubleshoot common microbiological issues.
5. Prepare and deliver a scientific presentation (graduate students only), demonstrating effective communication of technical content.

Affective Domain (Attitudinal/Behavioral Learning Outcomes)

1. Demonstrate professionalism, punctuality, and ethical behavior in all course activities.
2. Exhibit respect for patient confidentiality and cultural diversity in case study discussions.
3. Show initiative and responsibility in independent study and quiz preparation.
4. Participate constructively in class discussions, contributing to a collaborative learning environment.
5. Reflect on the role of the medical laboratory professional in patient care and public health.

# MLS 5533 – MLS Management and Education

Advanced principles of current personnel, financial, regulatory issues, laboratory information systems, management, and education. Student presentations will be required. Students taking the course for graduate credit will prepare, conduct, and evaluate a project. PREREQ: Acceptance into the Medical Laboratory Science Program.

**MLS 5533 Course Outcomes**

Cognitive Domain (Knowledge and Comprehension)

1. Analyze foundational and advanced concepts in clinical laboratory management, including personnel supervision, budgeting, workflow design, and quality assurance.
2. Compare and contrast leadership theories and management styles relevant to healthcare environments.
3. Describe the regulatory and accreditation requirements for clinical laboratories, including CLIA, CAP, and Joint Commission standards.
4. Apply principles of instructional design to create effective educational materials for laboratory personnel.
5. Interpret and apply principles of conflict resolution, time management, stress management, and communication within the laboratory setting.
6. Evaluate peer-reviewed literature to extract and synthesize key themes in laboratory leadership and education.

Psychomotor Domain (Skills and Application)

1. Create a laboratory procedure that includes a logically structured format consistent with regulatory guidelines.
2. Develop training documentation and competency assessment tools to accompany a laboratory procedure.
3. Simulate the validation process for a new laboratory test, including appropriate documentation and workflow planning.
4. Prepare and deliver a professional oral or recorded presentation on a management or education topic.
5. Use technology effectively to produce organized and professional written reports and instructional materials.

Affective Domain (Professionalism and Attitude)

1. Demonstrate professionalism, accountability, and initiative in completing coursework and collaborative assignments.
2. Show respect for diverse perspectives during class discussions and peer presentations.
3. Exhibit ethical behavior in the preparation of original work and avoid plagiarism or inappropriate use of AI-generated content.
4. Participate in reflective discussions about the role of leadership, lifelong learning, and personal development in the clinical laboratory profession.
5. Demonstrate effective time management and organizational skills in meeting deadlines and expectations.

# MLS 5535 – Molecular Diagnostics

A comprehensive overview of the fundamental principles of medical molecular diagnostics and use of molecular techniques in the diagnosis of disease. Topics include: Nucleic acid structure and function, genetics, DNA chemistry, introduction to nucleic acid isolation, identification and amplification techniques. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5535 Course Outcomes

Cognitive Objectives (Knowledge, Application, and Analysis)

Students will be able to:

1. Define and explain core molecular biology concepts, including nucleic acid
2. structure, replication, transcription, translation, and regulation of gene
3. expression.
4. Describe the principles and methodology behind common molecular diagnostic
5. techniques (e.g., PCR, electrophoresis, hybridization, DNA sequencing,
6. BLAST).
7. Compare and contrast amplification and hybridization methods used in clinical
8. diagnostics.
9. Interpret the clinical significance, advantages, limitations, and applications of
10. molecular testing in infectious disease, oncology, identity testing, and inherited
11. disease detection.
12. Evaluate DNA sequence data and apply bioinformatic tools (e.g., BLAST,
13. BOLD) for result interpretation and organism identification.
14. Apply knowledge of specimen collection, processing, and quality assurance to
15. molecular laboratory procedures.
16. Critically appraise emerging technologies and peer-reviewed research in
17. molecular diagnostics to support evidence-based practice.
18. (Graduate only) Design and present a focused educational module on a selected
19. molecular diagnostic technique, including clinical relevance and methodology.

Psychomotor Objectives (Technical and Procedural Competencies)

While this is an online, didactic course, students will:

1. Demonstrate proficiency in simulated molecular diagnostic tasks, including
2. interpretation of chromatogram data and quality values.
3. Perform virtual or written exercises simulating nucleic acid extraction, PCR
4. setup, and DNA sequencing workflows.
5. Use online platforms (e.g., NCBI, BOLD) to analyze and compare DNA
6. sequence data to identify organisms or mutations.
7. Complete ASCP-style BOC practice questions and case-based exercises
8. reflecting real-world clinical problem-solving.
9. (Graduate only) Develop a quiz and deliver a professional presentation on a
10. molecular methodology, simulating laboratory education and peer instruction.

Affective Objectives (Professionalism and Ethical Conduct)

The student will:

1. Demonstrate responsibility by submitting assignments on time and engaging consistently with online course content.
2. Comply with academic integrity policies in all submitted work and collaborations.
3. Respect the collaborative learning process through appropriate communication in group activities and peer review.
4. Recognize the role of molecular diagnostics in patient care and the ethical responsibilities associated with genetic and molecular testing.
5. Value lifelong learning and professional development as essential components of clinical laboratory practice.
6. (Graduate only) Model professional communication through delivery of a scholarly presentation to peers.

# MLS 5537 - Critical Analysis of Lab Information

Evaluation of clinical laboratory values with emphasis on advanced methods, specialized statistics, algorithm building, and clinical correlations. Graduate students will prepare, conduct, and evaluate case study sessions. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5537 Course Outcomes

Cognitive Objectives (Knowledge-Based Learning)

1. Integrate prior knowledge from hematology, hemostasis, immunohematology, microbiology, molecular diagnostics, chemistry, immunology, and urinalysis to evaluate complex clinical case studies and laboratory results.
2. Critically analyze and synthesize findings from current medical laboratory literature to support evidence-based diagnostic reasoning.
3. Identify appropriate follow-up testing based on clinical and laboratory data in a multidisciplinary context.
4. Demonstrate a comprehensive understanding of coagulation pathways and advanced hematologic conditions through targeted assessments.
5. Apply foundational knowledge across all MLS subject areas to successfully complete ASCP Board of Certification (BOC) exam review modules.

Psychomotor Objectives (Skills-Based Learning)

1. Develop and present a case study or educational presentation demonstrating applied understanding of integrated laboratory results and disease correlation. (Graduate students only)
2. Accurately complete ASCP BOC review modules and maintain detailed study notes to support exam preparation and clinical problem-solving.
3. Apply problem-solving skills in real-time during case-based discussions and written exams involving coagulation and advanced hematology.
4. Actively participate in professional learning activities including lectures, panels, and conferences to bridge theory with practice.

Affective Objectives (Professionalism, Ethics, and Attitudes)

1. Exhibit professionalism and respectful communication during lectures, group discussions, and conference events.
2. Demonstrate personal accountability and academic integrity through timely assignment completion and adherence to university honor codes.
3. Engage in reflective thinking and constructive dialogue with peers, faculty, and guest speakers to enhance clinical reasoning skills.
4. Participate in professional development by attending and contributing to the ASCLSIdaho conference, demonstrating commitment to lifelong learning and leadership in the MLS profession.

# MLS 5539 - Advanced Concepts in Transfusion Medicine

Advanced topics in Immunohematology. Application of laboratory techniques to the identification and evaluation of antibodies and antigens. Emphasis on transfusion therapy. Graduate students will prepare, conduct, and evaluate case study sessions.

**MLS 5539 Course Outcomes**

Cognitive Domain (Knowledge and Understanding)

1. Explain the complex mechanisms of transfusion reactions, including hemolytic and non-hemolytic reactions, and their clinical implications.
2. Describe the pathophysiology of Hemolytic Disease of the Fetus and Newborn (HDFN) and the diagnostic approaches used in managing this condition.
3. Identify the immunological principles underlying alloimmunity and autoimmunity in transfusion medicine.
4. Discuss current approaches to cellular and apheresis therapies and their applications in transfusion medicine.
5. Analyze and interpret laboratory results to identify antibodies and resolve complex serologic problems related to blood transfusions.
6. Evaluate the criteria and guidelines for the safe and effective use of blood components, including regulatory standards (AABB, FDA).

Psychomotor Domain (Skill Simulation and Application)

1. Perform antibody identification techniques and interpret the results for clinical decision-making in transfusion therapy.
2. Demonstrate proficiency in resolving complex serological discrepancies using standard laboratory techniques, such as agglutination, enzyme testing, and gel testing.
3. Apply proper techniques in the preparation, crossmatching, and transfusion of blood products in simulated or clinical settings.
4. Utilize laboratory instrumentation to assess the compatibility of blood and blood components with patients' blood samples.
5. Complete blood component testing and crossmatching with accuracy and attention to patient safety, ensuring the correct blood component is transfused.

Affective Domain (Attitudes, Professionalism and Ethics)

1. Demonstrate professional and ethical behavior in handling patient specimens, data, and transfusion-related information, in compliance with confidentiality regulations (e.g., HIPAA).
2. Exhibit a commitment to patient safety by following proper protocols for transfusion therapy, reacting appropriately to adverse events, and reporting any incidents promptly.
3. Foster a collaborative approach to patient care by working effectively with healthcare professionals, including physicians, nurses, and other laboratory personnel in transfusion settings.
4. Promote continuous learning and self-improvement by seeking out current research, best practices, and new technologies in transfusion medicine.
5. Develop an understanding of the importance of cultural competence in transfusion practices, including respecting patients' values and preferences regarding blood transfusions.

# MLS 5541- MLS Research

Individual theory and application of related topics associated with the medical laboratory. PREREQ: Acceptance into the Medical Laboratory Science Program.

## MLS 5541 Course Outcomes

Cognitive Domain (Knowledge, Comprehension, Application, Evaluation)

Students will:

1. Define and articulate the steps of the research process, including topic formulation, literature review, and citation.
2. Differentiate between types of research methodologies, including qualitative and quantitative approaches.
3. Identify and access credible electronic and print sources, including peer-reviewed journal articles and scientific databases.
4. Evaluate the quality, relevance, and credibility of research studies and online resources.
5. Analyze and summarize findings from current medical laboratory literature.
6. Construct a well-written research abstract following standard formatting and scientific style.
7. Apply research skills to synthesize information into organized, evidence-based written assignments.

Psychomotor Domain (Application of Skills, Research Practices)

Students will:

1. Conduct online literature searches using university-provided databases and advanced search techniques.
2. Navigate and retrieve full-text scientific articles using proper keyword selection and Boolean operators.
3. Format citations accurately using APA or AMA guidelines.
4. Demonstrate proper use of digital tools (e.g., library databases, citation generators, academic search engines) to complete research assignments.
5. Submit research-based assignments that reflect correct formatting, structure, and professional writing mechanics.

Note: As a research-focused and online course, psychomotor outcomes are assessed through application of information literacy skills, digital search competency, and structured writing tasks rather than laboratory procedures.

Affective Domain (Professionalism, Communication, Ethical Conduct)

Students will:

1. Demonstrate academic integrity by avoiding plagiarism and properly citing all sources.
2. Show professional responsibility by adhering to assignment deadlines and academic expectations.
3. Display initiative and independence in research activities, including topic selection and problem-solving.
4. Respect diverse viewpoints and academic discourse within discussion forums or peer-review activities.
5. Communicate research findings clearly and professionally in both written and verbal (if applicable) formats.
6. Reflect on the importance of evidence-based practice in medical laboratory science and its impact on healthcare outcomes.

# MLS 5555 - MLS Student Laboratory Practices

Directed practice in the advanced tests and techniques in common use in the medical laboratory (including molecular biology, microbiology, hematology, chemistry, blood bank). PREREQ: Acceptance into the Medical Laboratory Science Program.

**MLS 5555 Course Outcomes**

Cognitive Domain (Knowledge and Understanding):

1. Explain the principles and methodologies behind advanced laboratory procedures in transfusion medicine and microbiology.
2. Differentiate between types of laboratory tests and their appropriate clinical applications (e.g., ABO/Rh typing, antibody screening and identification, culture and sensitivity testing).
3. Interpret results of serological and microbiological assays and relate findings to patient conditions.
4. Evaluate quality control, quality assurance, and regulatory compliance in laboratory procedures.
5. Apply clinical decision-making and problem-solving skills in the resolution of complex serologic and microbiologic testing scenarios (e.g., ABO discrepancies, mixed cultures, resistance patterns).

Psychomotor Domain (Skill Simulation and Performance):

1. Perform basic and advanced laboratory procedures with accuracy and precision, including but not limited to:
   1. Antibody identification
   2. Crossmatching techniques
   3. Antiglobulin testing (direct and indirect)
   4. Elution techniques
   5. Gram staining and interpretation
   6. Culture handling and organism identification
   7. Biochemical and antimicrobial sensitivity testing
   8. Acid-fast staining, germ tube testing, india ink prep, and KOH prep
2. Demonstrate proficiency in the use and maintenance of laboratory instrumentation and software relevant to transfusion medicine and microbiology.
3. Execute all laboratory techniques while adhering to established protocols for safety, infection control, and universal precautions.
4. Document laboratory findings accurately and appropriately in accordance with laboratory systems and reporting standards.

Affective Domain (Attitudes, Professionalism and Ethics):

1. Exhibit professional conduct, including dependability, integrity, and respect for others in a clinical laboratory setting.
2. Communicate effectively with instructors, peers, and healthcare team members regarding laboratory procedures and results.
3. Demonstrate accountability for timely completion of assignments, attendance, and preparation for laboratory sessions.
4. Show commitment to continuous improvement by seeking feedback, self-evaluating performance, and striving for competency.
5. Comply with ethical and regulatory guidelines pertaining to patient confidentiality, specimen integrity, and laboratory safety.

# MLS 5590 – 5594 Practicum Experiences

Structured medical laboratory experiences as determined by Medical Laboratory Science faculty.