MS-MLS Coursework:

Year 1 Coursework:

- **MLS 5000 - Clinical Practice in Laboratory Science Credits: 3**
- **MLS 5010 - Seminar in Education and Management in Medical Laboratory Sciences Credits: 1**
- **MLS 5020 - Seminar in Medical Laboratory Science Research Credits: 1**
- **MLS 5100 - Medical Microbiology I Credits: 2**
- **MLS 5110 - Medical Microbiology II Credits: 6**
- **MLS 5150 - Parasitology for Medical Laboratory Scientists Credits: 1**
- **MLS 5160 - Mycology for Medical Laboratory Scientists Credits: 1**
- **MLS 5170 - Mycology and Parasitology Laboratory Credits: 2**
- **MLS 5250 - Immunology, Serology, and Molecular Diagnostics Credits: 2**
- **MLS 5300 - Urinalysis Credits: 1**
- **MLS 5310 - Body Fluids Credits: 1**
- **MLS 5400 - Hematology I Credits: 2**
- **MLS 5410 - Hematology II Credits: 3**
- **MLS 5430 - Coagulation Credits: 2**
- **MLS 5440 - Immunohematology Credits: 4**
- **MLS 5500 - Chemical Analysis of Biophysiology Credits: 4**
- **MLS 6000 - Advanced Medical Laboratory Sciences Credits: 1**
- **MLS 6100 - Clinical Microbiology Credits: 3**
- **MLS 6400 - Clinical Hematology Credits: 3**
- **MLS 6410 - Clinical Immunohematology Credits: 3**
- **MLS 6500 - Chemical Analysis of Clinical Biophysiology Credits: 3**
- **MLS 6600 - Clinical Molecular Diagnostics Credits: 1**

Year 2 Coursework:

- **MHA 5000 - Fundamentals of Health Care Systems and Organizational Structures Credits: 3**
- **MHA 5020 - Health Care Human Resources, Organizational Behavior, Change, and Development Credits: 3**
- **MHA 5090 - Financial Analyses and Application in Health Care Organizations Credits: 3**
- **MLS 6900 - Management Capstone in Medical Laboratory Sciences Credits: 1**

MS-MLS Course Descriptions:

MLS 5000 - Clinical Practice in Laboratory Science Credits: 3

- Students in this class become familiar with the principles and applications of ethical practice and professionalism in medical laboratory science, including analytical techniques, laboratory mathematics and data handling, laboratory instrumentation and methodologies, specimen collection and handling, and safety regulations. Quality control, quality assurance, and quality improvement, including pre-analytical, analytical, and post-analytical variables and method verification are emphasized.

MLS 5010 - Seminar in Education and Management in Medical Laboratory Sciences Credits: 1

- Students explore basic theory in training and management in the medical laboratory. Through class discussions and case-based study, students prepare an instructional unit on a technical subject relevant to the medical laboratory. In the management unit, students develop a theoretical foundation and basic skills for assuming initial laboratory leadership roles and prepares students for MLS certification requirements and later advanced study in healthcare administration. Students develop professional assessment activities that can measure employee competency and to devise training checklists and activities that can be used for new employee orientation and MLS student internships.

MLS 5020 - Seminar in Medical Laboratory Science Research Credits: 1

- Students explore the theory behind laboratory research practice, including evaluation of source materials and ethical considerations of research. Students complete a proposal in which they formulate a research question supported by a literature review and write a research paper based on their findings. Students in this course create a poster presentation at a national or regional MLS meeting.

MLS 5100 - Medical Microbiology I Credits: 2

- Students explore the theoretical and technical aspects of the major categories of medically important bacteria and their relationship to both normal human microbiota and the pathogenic organisms found in clinical settings. During laboratory sections they learn principles of sample preparation and evaluation, rapid testing methods, and basic techniques used in clinical microbiology laboratories, including sterile technique, collection and transport of clinical specimens, gram stain testing and interpretation, testing methodologies, and the identification of the major classes of medically important aerobic organisms as they relate to human body site anatomy.

MLS 5110 - Medical Microbiology II Credits: 6

- Students expand on their knowledge from MLS 5100 and focus on advanced principles of testing methodologies, techniques for isolation and identification, and determination of clinical relevance by body site. In lab students identify pathogens in routine aerobic and anaerobic cultures, including associated problem-solving of discrepant culture results and troubleshooting unexpected assay performance. Students also explore antimicrobial susceptibility testing and molecular methods for rapid detection of pathogenic organisms.

MLS 5150 - Parasitology for Medical Laboratory Scientists Credits: 1

- Students study parasites present in the human body either as commensals or potential pathogens. They gain a knowledge of parasitic life cycles including an understanding of the ways infection is acquired and spread, the pathogenicity of disease, and the ways in which disease might be controlled. They also see examples of morphological criteria to permit the correct identification of a wide range of human parasites.

MLS 5160 - Mycology for Medical Laboratory Scientists Credits: 1

- Students study medically important fungi, including yeast, dermatophytes, and opportunistic and dimorphic fungi. We put emphasis on morphologic identification, both macroscopically and microscopically, of pathogenic organisms as well as the saprophytes (contaminants) encountered in clinical specimens.

MLS 5170 - Mycology and Parasitology Laboratory Credits: 2

- Students learn techniques used in clinical laboratories to collect, isolate, and identify fungi and parasites in patient samples.

MLS 5250 - Immunology, Serology, and Molecular Diagnostics Credits: 2

- Students explore theories of immunodiagnostics and immunopathology, and apply those theories to practical applications in clinical analysis. They review principles of serologic and molecular methods of clinical diagnosis and correlate these with human disease. Specific assays are covered with a focus on diagnosis of clinical processes. We emphasize problem-solving of discrepant results and troubleshooting of assay performance through review of case simulations.

MLS 5300 - Urinalysis Credits: 1

- Students analyze renal anatomy and physiology as they relate to urine formation and composition in health and disease. Through laboratory experiences, students perform chemical and microscopic analyses of urine, interpret findings in relation to normal and abnormal physiology, operate and maintain laboratory instrumentation, and correlate results with disease processes.

MLS 5310 - Body Fluids Credits: 1

- Students in this course learn to accurately analyze certain body fluids encountered in the field of laboratory medicine. These fluids include cerebral spinal fluid (CSF), serous fluids, synovial fluid, and semen. The student learn to perform appropriate testing methods, analyze results, troubleshoot inconsistent results, recognize sources of error, and correlate testing results with clinical patient data and associated disease states.

MLS 5400 - Hematology I Credits: 2

- Students become familiar with the structure and function of red blood cells, leukocytes and platelets, and the concepts of hematopoiesis and cell maturation with an emphasis on normal morphology and its correlation with the complete blood count (CBC) report. After reviewing the principles of laboratory techniques, students master routine testing methods including cell and reticulocyte counts, hemoglobin and hematocrit, sedimentation rates, and complete blood count reports and indices calculations.

MLS 5410 - Hematology II Credits: 3

- Students become familiar with the morphology of abnormal blood cells and the pathogenesis and mechanisms of hematologic disorders, including proliferative disorders, normal and abnormal hemoglobin disorders, anemias, and leukemia. Students perform routine clinical tests and correlate results with disease state, hematopoiesis and identification of the maturation sequence as seen in peripheral blood and bone marrow, maintenance and quality control of instrumentation as well as back up manual methods. Problems of discrepant results and troubleshooting of methodologies are emphasized.

MLS 5430 - Coagulation Credits: 2

- Students in this course explore hemostatic mechanisms, including the study of coagulation in the intrinsic and extrinsic systems, platelet and vessel function, and hypercoagulability. Analytical methodologies for the detection of abnormalities are studied for all systems.

MLS 5440 - Immunohematology Credits: 4

- Students develop theoretical and technical skills related to blood banking (immunohematology) in the first half of the course, including quality control, blood group serology, human blood group antigens and antibodies and their significance, antibody detection and identification, current transfusion practices, and component transfusion therapy. They progress into advanced theoretical and laboratory techniques in the second half, covering hemolytic diseases of newborns and complex transfusion service problem-solving, as well as screening and care of donors, donor blood collection and processing, and storage of blood components.

MLS 5500 - Chemical Analysis of Biophysiology Credits: 4

- Students explore analytical procedures used in chemistry and the physiological chemistry of renal function, water balance, electrolytes, acid-base balance, point-of-care techniques, endocrinology, liver function, cardiac function, lipid metabolism, protein analysis/electrophoresis, therapeutic drug monitoring, drugs of abuse, and chemistry automation. Students engage in laboratory sessions with assorted clinical laboratory procedures, interpret results, troubleshoot, develop strategies for continuous assessment of laboratory performance, and analyze quality control data in each of the major areas of clinical chemistry. Their interpretation is enhanced through laboratory reports and clinical case analysis.

MLS 6000 - Advanced Medical Laboratory Sciences Credits: 1

- Students gain an advanced and comprehensive overview of medical laboratory science knowledge, concepts, correlations, and applications for the student who has completed the MLS didactic and lab curriculum. Course content aligns with student clinical courses. Students qualify to sit for national certification and entry into the profession upon successful completion of this course and applied clinical coursework.

MLS 6100 - Clinical Microbiology Credits: 3

- In a professional, clinical setting, students apply techniques and methods used for the isolation and identification of bacteria, viruses, fungi and parasites considered to be of human pathogenic significance. Students interpret results from rapid identification techniques, molecular testing, and organism culture by body site. Students also perform and interpret antibiotic susceptibility testing of bacteria. Emphasis is placed on quality control and performance improvement methods, and safety procedures used in the modern clinical laboratory.

MLS 6400 - Clinical Hematology Credits: 3

- Students in this course apply the theoretical and classroom laboratory knowledge of medical hematology to a professional, clinical setting. Students become familiar with medical laboratory workflow as they process specimens, analyze body fluids, perform routine and emergency testing procedures, read differential morphology, and interpret results. Instrument maintenance and quality control are emphasized.

MLS 6410 - Clinical Immunohematology Credits: 3

- Students will perform routine testing in a hospital or blood donation center. Students learn and apply proper care and use of equipment and materials, perform blood group determinations, compatibility testing, antibody identification, and pre- and post-natal testing of newborns and mothers. Instruction includes appropriate follow up and specialized testing as it relates to transfusion reactions and result interpretation. Problem solving and troubleshooting as they relate to patient test results are emphasized.

MLS 6500 - Chemical Analysis of Clinical Biophysiology Credits: 3

- In this clinical rotation, students gain experience with automated testing procedures and high-volume workflow using a variety of clinical analysis methodologies. Areas of student participation include automated analysis using spectrophotometric and immunochemical single and multichannel discrete analysis systems, blood gas analysis, therapeutic drug monitoring, drugs of abuse screening and identification, hormone assessment, and computer-controlled instrumentation. This clinical practicum includes colorimetric, kinetic, and enzymatic analysis, the use of immunoassay and molecular techniques.

MLS 6600 - Clinical Molecular Diagnostics Credits: 1

- Students in this course gain practical experience in clinical molecular diagnostics, including sample collection and preparation, methodologies, and instrumentation. Students work in a professional setting under the supervision of a practicing medical laboratory scientist.

MHA 5000 - Fundamentals of Health Care Systems and Organizational Structures Credits: 3

- Students in this course engage in an overview of the U.S. health care system. Students will learn about the role of providers in different health care settings, payers, intermediaries and other public and corporate entities involved in the delivery of health care services. Organizational structures, economic and political influences, financing and payment and evolving changes occurring in the health industry in the United States will be evaluated. Perspectives of the various stakeholders and cultural challenges in health care delivery are also reviewed. Critical issues such as access, quality, utilization, costs, technology, regulation, and ethics will be analyzed.

MHA 5020 - Health Care Human Resources, Organizational Behavior, Change, and Development Credits: 3

- Students in this course will analyze and evaluate concepts and theories surrounding human resources and organizational behavior/development pertaining to the health care industry. Topics of study include: human resource functions; job analysis and design; recruitment, selection, and retention; performance management; employee relations; training, compensation, benefits; organizational development/behavior; HR legal and regulatory policies; organized labor; workforce innovation, forecasting, emotional intelligence and diversity.

MHA 5090 - Financial Analyses and Application in Health Care Organizations Credits: 3

- Students in this course will be familiarized with the financial statements used to manage health care businesses and the essential skills of financial statement analysis and budgeting. Students will explore the key elements of managing the revenue cycle in health care, pricing, cost analysis, expense management, and capital investment analysis. Students in the course will also be challenged to use financial and operational data to support management decision-making.

MLS 6900 - Management Capstone in Medical Laboratory Sciences Credits: 1

- Working in small teams, students apply the theories in healthcare administration to practice in case-based analysis specific to medical laboratory sciences. Students prepare a written case analysis that they present for discussion by their peers and evaluation by internal and external stakeholders.