

SCHOOL OF MEDICAL LABORATORY SCIENCE

2026 LECTURE & LABORATORY COURSE DESCRIPTIONS

BLOOD BANK

3.5-weeks didactic lecture

1. Integrate concepts from across all other lecture disciplines and apply them to the Immunohematology (Blood Bank) Laboratory. Topics include blood group systems, blood group genetics, and serologic testing.
2. Learn about the risks of transfusion, transfusion reactions, and how to safely provide blood components to special patient populations including those with cancer, pregnancy, sickle cell anemia, autoimmune hemolytic anemias, transplant recipients, neonates, and trauma patients.
3. Special topics include donor requirements, federal regulations, and ethical considerations.

5-weeks laboratory rotation

1. Observe and practice routine blood bank procedures in one of the country's busiest Transfusion Medicine Laboratories, including "Emergency Procedures".
2. Opportunity to work in an automated and fully computerized Blood Bank.
3. Extensive opportunity to work with patient problems (after competence demonstrated in routine work).
4. Work with wide variety of blood components.
5. Opportunity to observe/work with a wide variety of bone, tissue products and organs for transplantation.

CHEMISTRY / IMMUNOLOGY / URINALYSIS:

8-weeks didactic lectures

1. PowerPoint based lectures cover the fundamentals and advanced physiology of the immune system.
2. Learn the pathophysiology of a variety of immune conditions including autoimmune disease, immunodeficiency states, infectious disease, and hypersensitivity reactions as well as laboratory testing.
3. Chemistry and Immunology lectures focus on normal physiology, pathophysiology, and laboratory analytes for systems and diseases spanning the entire human body.
4. Urinalysis lectures focus on the clinical applications of analyzing urine including include physical, chemical, and cellular examination of urine and correlation of laboratory test results to disease states.
5. The curriculum is patient-focused using patient testimonials and case studies for application of concepts.

5-weeks laboratory rotation

1. Chemistry rotation includes hands-on experience on many automated and robotic chemistry analyzers including instrumentation set-up, operation, maintenance, troubleshooting, and review/reporting of patient results under the supervision of teaching technologists/staff. Rotation in Stat Lab, performing testing from patients from Emergency Room, OR, Pre-Op and PACU, and ICU's.
2. Special Chemistry (Immunology) rotation includes testing for immune status (e.g., rubella, EBV, herpes simplex, CMV, lyme disease, VZ, COVID), infectious disease (syphilis, HIV and Hepatitis), allergy, autoimmune disease, tumor marker testing, and Hemoglobin A1c testing.
3. Toxicology rotation includes performing analytical assays to screen and confirm drugs of abuse, routine TDM (immunosuppressive therapies, anti-epileptic drugs, cardio-active drugs, and antibiotics) and toxic alcohol screening. Analyses utilize instruments such as high-performance liquid chromatography, gas chromatography and mass spectrometry.
4. Immunoassay topics covering immuno-electrophoretic, immuno-fixation, ELISA, ligand binding assays, thyroid function assays, immunoassay drug measurement, and various antigen/antibody assays.
5. Urinalysis rotation includes automated urinalysis, manual urinalysis, microscopic sediment review and additional diagnostic urine testing.
6. Supplemental self-study modules in electrophoresis, urinalysis, method evaluation and statistical analysis.

TOPICS IN CLINICAL EDUCATION AND LABORATORY OPERATIONS

- Asynchronous, self-study lectures and written assignments in current topics related to clinical education and laboratory operations.
- Clinical observations in the disciplines of Phlebotomy (1-day observation), Flow Cytometry (2-days) and Ancillary Testing (Point of Care) including their impact on direct patient care.

HEMATOLOGY / HEMOSTASIS

6 weeks didactic lectures

1. PowerPoint based lectures with supplemental didactic material from Pathologists.
2. Advanced theory and laboratory application of normal blood cell hematopoiesis, function, and morphology as well as coagulation processes.
3. Emphasis of abnormal blood cell / coagulation states with regards to pathophysiology, laboratory testing, and treatment. Topics include anemias, hemoglobinopathies, white blood cell disorders, leukemias/lymphomas, myeloproliferative neoplasms, myelodysplastic syndromes, and coagulation deficiencies.
4. Body fluid lectures emphasize the laboratory evaluation of cerebrospinal, amniotic, bronchoalveolar lavage, serous, synovial, and semen fluid, including normal and abnormal composition and morphology.
5. Introduction to hematological and coagulation laboratory instrumentation.

5-weeks laboratory rotation

1. Hands-on experience with state-of-the-art, robotic instrumentation Sysmex XN hematology system including blood cell analyzers, automated blood smear slide maker-stainers, and automated RBC sedimentation rates in a modular workstation arrangement.
2. Case study collections of both peripheral blood, body fluid and bone marrow morphology.
3. Hands-on experience with routine coagulation using various coagulation analyzers.
4. Observe and perform diagnostic coagulation testing using reference laboratory techniques including platelet aggregation, platelet function analysis, and other special coagulation testing.
5. Available resource material in the form of textbooks, journal articles, and audiovisuals including PowerPoint lectures, slides study sets, videos, and online webinars.
6. Additional bench rotation topics including sickle cell screening, bone marrow processing, urinalysis, and leukemic blood cell cytochemistry.
7. Urinalysis, body fluid analysis, and semen analysis

MICROBIOLOGY / MYCOLOGY / PARASITOLOGY

6-weeks didactic lecture

1. Online PowerPoint based lectures for the laboratory disciplines of Clinical Microbiology, Mycology, Parasitology and Molecular Techniques.
2. The primary focus in each discipline (course) will be on the history, physiology, clinical presentation, and laboratory findings in both the normal state and various disease states.
3. Lectures will be taught via a combination of traditional in-class lecture and a variety of active learning activities such as case discussion, written assignments, game or video reviews, etc.
4. Each discipline - Microbiology, Mycology and Parasitology - must be passed successfully before proceeding to the clinical laboratory rotation segment.

4-weeks laboratory rotation

1. Individualized instruction at live bench or student bench with clinical instructor reviewing patient cultures.
2. Hands-on experience in how to read culture plates (normal flora vs potential pathogens).
3. Extensive experience with a variety of specimen sources, e.g., urine, blood, respiratory; and with special procedures for anaerobes, antibiotic susceptibility, mycology, mycobacteria, and parasitology.
4. Working experience with state-of-the-art Microbiology instrumentation.
5. Comprehensive review of mycology and parasitology including audio-visual materials and case studies.
6. Several Microbiology molecular tests will be demonstrated for *C. difficile* toxin, Influenzae and CSF (Cerebral Spinal Fluid) viral/bacteria/fungal meningitis or encephalitis.

MOLECULAR PATHOLOGY:

3.5-day laboratory rotation

1. Laboratory techniques: Total nucleic acid extraction, purification, and processing for the above assays; manual DNA extraction (blood and bone marrow); gel electrophoresis and photography.
2. *In vitro* nucleic acid amplification techniques: Polymerase Chain Reaction (PCR), Reverse Transcription (RT-PCR), and Real-Time PCR.
3. Clinical Pathology laboratory: Infectious disease topics: Chlamydia/Gonorrhea, Respiratory Virus Panel, Human Papillomavirus, Hepatitis and HIV. Respiratory and HSV viral detection by MALDI methodology.
4. Anatomic Pathology laboratories: Next Gen Sequencing and Advanced Diagnostics observations.
5. Specialized genotyping topics: Cystic Fibrosis, Thrombotic Risk, ACE Genotyping, JAK2 and BCR.