

# CLS-Clinical Laboratory Science

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## **CLS 501. Introduction to the Clinical Laboratory. 3 Hours.**

Overview of issues and skills surrounding working in the modern laboratory environment; introduction to roles and functions of a medical laboratory scientist; includes safety, equipment, mathematics, measurements, microscopy, dilutions, quality assurance, regulations of the laboratory, laboratory operations, and educational principles.

## **CLS 502. Fundamentals of Phlebotomy and Body Fluid Collection. 1 Hour.**

An in depth course in phlebotomy covering aspects of safety procedures, hygiene, capillary puncture, venipuncture, arterial access and maintenance, intravenous access and maintenance, drug administration via IV, intramuscular and subcutaneous methods and non-blood collections of bodily fluids.

## **CLS 503. Body Fluids. 1 Hour.**

Diagnosis and monitoring of renal and systemic disease through the physical, biochemical, and microscopic analysis of urine and feces. Diagnosis of central nervous system and systemic disease through cerebrospinal fluid analysis. Diagnosis of metabolic and infectious disease through analysis of peritoneal fluid, synovial fluid, transudates, and exudates. Fertility testing using semen analysis.

## **CLS 504. Lab Analysis of Body Fluids. 1 Hour.**

Application of diagnosis and monitoring of renal and systemic disease through the physical, biochemical, and microscopic analysis of urine and feces. Diagnosis of central nervous system and systemic disease through cerebrospinal fluid analysis. Diagnosis of metabolic and infectious disease through analysis of peritoneal fluid, synovial fluid, transudates, and exudates. Fertility testing using semen analysis.

## **CLS 505. Laboratory Management. 3 Hours.**

Roles and functions of clinical laboratories and practitioners; professionalism and ethics; educational methodology and training; professional and interpersonal communication; behavioral aspects of management; leadership styles and management theory; team-building; legal issues related to employment; recruitment, interview and selection of personnel; organizational culture and behavioral change; laboratory operations; safety, governmental regulations, standards and compliance; marketing, outreach, and business plan; budget, cost analysis, reimbursement; critical pathways, decision-making, test utilization; performance improvement, quality assessment; risk management, evidence-based laboratory medicine.

## **CLS 518. Immunology. 3 Hours.**

Physiology of immune responses to infectious agents, tumors, transplant; abnormal responses: hypersensitivity, autoimmunity, immunoproliferative disorders, and immunodeficiencies; antigen-antibody reaction; complement; application of immunologic tests.

## **CLS 523. Clinical Microbiology. 3 Hours.**

Reservoirs, modes of transmission, disease associations, and morphological and biochemical characteristics of microorganisms commonly isolated in the clinical laboratory; methods used to isolate and identify bacteria, parasites, and fungi.

## **CLS 524. Clinical Microbiology Laboratory. 1 Hour.**

Performance of techniques and tests used in the isolation and identification of bacteria, fungi, and parasites commonly seen in a clinical microbiology laboratory.

## **CLS 526. Instrumentation & Automation. 2 Hours.**

Study of the theory and principles of automation and instrumentation used in laboratories emphasis will be placed on quality control, quality assurance, instrumentation principles, basic statistics, and the regulatory, and economic issues encountered in laboratories including, clinical labs, health labs, government labs, private labs and other laboratories.

## **CLS 527. Instrumentation and Automation Laboratory. 1 Hour.**

Practical application of automation and instrumentation used in laboratories. Emphasis will be placed on quality control, quality assurance, instrumentation principles, basic statistics, and the regulatory, and economic issues encountered in laboratories including, clinical labs, health labs, government labs, private labs and other laboratories.

## **CLS 528. Hematology I. 3 Hours.**

Systematic examination of blood cells: normal function; recognizing their microscopic appearance; blood cell disorders; standard and special clinical hematology laboratory procedures; validation of laboratory data; interpretation of results, and quality assurance.

## **CLS 529. Hematology I Laboratory. 1 Hour.**

Practical application of Hematology I as applicable to diagnostic assays in clinical laboratories. An emphasis will be placed on hematology lab principles; complete blood count analysis, manual hematology procedures, automated and manual differentials, cell identification, procedural determination of various clinical diseases and disorders (anemia, leukemia etc.,) quality control and quality assurance procedures in the hematology lab.

## **CLS 530. Immunohematology. 4 Hours.**

Immunogenetics, serological characteristics, and clinical significance of blood group systems; antibody identification; pretransfusion testing and problem-solving; donor blood collection; component preparation; transfusion and cellular therapy; investigation and treatment of immune hemolytic disorders.

## **CLS 531. Immunohematology Laboratory. 1 Hour.**

Red cell phenotyping, antibody detection and identification, pretransfusion testing, and laboratory investigation to diagnosis and treat hemolytic anemias.

## **CLS 532. Hematology II. 3 Hours.**

Structure and function of hematopoietic and lymphatic tissue. Stem cell differentiation, hematopoiesis, erythrocyte and leukocyte kinetics. Laboratory diagnosis and case management of anemia, lymphoma, myeloma, acute and chronic cell morphology, cell population scatter plots and histograms, cytochemistry, immunophenotyping, molecular methods, and cytogenetics. Hematology laboratory problem solving.

**Prerequisites:** CLS 528 [Min Grade: C]

## **CLS 533. Hematology II Laboratory. 1 Hour.**

Practical application as applicable to diagnostic assays in clinical laboratories. An emphasis will be placed on hematology lab principles; complete blood count analysis, manual hematology procedures, normal and abnormal peripheral blood smear differentials, cell identification, procedural determination of various clinical diseases and disorders (anemia, leukemia etc.,) bone marrow analysis, quality control and quality assurance procedures in the hematology lab.

## **CLS 538. Infectious Diseases. 3 Hours.**

Pathogenic mechanisms of infectious diseases; normal flora and pathogens of various body sites; methods for collection, transport, and culturing different types of clinical specimens; interpretation of cultures.

**Prerequisites:** CLS 523 [Min Grade: C]

**CLS 539. Infectious Diseases Laboratory. 1 Hour.**

Performance and interpretation of direct Gram stains; culturing various types of clinical specimens for isolation of bacteria; performing and interpreting tests used in the identification of potential pathogens; reporting culture results; antimicrobial susceptibility and resistance testing.

**Prerequisites:** CLS 524 [Min Grade: C]

**CLS 542. Molecular Diagnostics. 3 Hours.**

Study of molecular biochemistry, medical genetics, molecular pathophysiology, and the theory of molecular tests.

**CLS 543. Molecular Diagnostics Lab. 1 Hour.**

Practical application of the isolation of nucleic acids, analysis of nucleic acids and protein, cytogenetics, and the interpretation of various molecular methods.

**CLS 551. Clinical Chemistry. 4 Hours.**

Theory of clinical laboratory techniques to identify and quantitate chemical analytes in body fluids and the correlation of these analytes to human disease.

**CLS 552. Clinical Chemistry Laboratory. 1 Hour.**

Performance of laboratory techniques used to identify and quantitate chemical analytes in body fluids and the correlation of these analytes to human disease.

**CLS 560. Clinical Correlations. 3 Hours.**

Correlate clinical, technical and analytical proficiencies that comprise clinical laboratory science practice. Analyze and interpret case studies through selection, application, and interpretation of clinical laboratory protocols.

**Prerequisites:** CLS 532 [Min Grade: C](Can be taken Concurrently) and CLS 538 [Min Grade: C](Can be taken Concurrently) and CLS 551 [Min Grade: C](Can be taken Concurrently)

**CLS 570. Medical Laboratory Science Certification Review. 1 Hour.**

Review of medical technology/ clinical laboratory science body of knowledge with required comprehensive trial certification final examination using self-directed online materials. Experience with the development of a personal certification maintenance plan to meet requirements defined by national certification agencies in Clinical Laboratory Sciences.

**CLS 595. Clinical Practice. 1-12 Hour.**

Directed clinical practice in immunohematology laboratory procedures and methods, problem-solving, quality assurance, preventive maintenance, and safety.

**CLS 686. Special Topics in Clinical Laboratory Sciences. 1-4 Hour.**

Selected advanced topics of current scientific, clinical, and professional importance; specific topics designed to meet student need and interest.

**CLS 698. Master's Level Non-Thesis Research. 1-6 Hour.**

**CLS 699. Thesis Research. 1-6 Hour.**

Implementation of research. Must be admitted to master level candidacy. Must have approval IRB. Must have a 3 member committee approved by the graduate dean.

**Prerequisites:** GAC M