CLS - Clinical Laboratory Sciences

Course Descriptions - Clinical Laboratory Sciences (CLS)

CLS 500. Biological and Chemical Weapons: Detectors/Response. -- Awareness of biological, chemical and social sciences concepts related to biological and chemical weapons. Identification of competencies needed by individuals, healthcare practitioners and researchers to detect and minimize harm to the public's health caused by biological and chemical weapons. 2 hours.

CLS 520. Clinical Chemistry I. --Principles and methods of analysis of biochemical metabolites used in medical laboratories; instrumentation; automation and instrument problem solving; accreditation; quality control and quality assurance. Metabolism of carbohydrates, proteins, heme, lipids and enzymes, and correlation of laboratory data. Case studies of common diseases and specimen problems. Prerequisites: Organic Chemistry, AHS 400 or 500 or concurrent enrollment. 4 hours. (Also MT 320)

CLS 525. Immunology. --Physiology of immune responses to infectious agents, tumors, transplants; abnormal responses: hypersensitivity, autoimmunity, immunoproliferative disorders, and immunodeficiencies; antigen-antibody reactions; complement; application of immunologic tests in infectious and autoimmune diseases. Prerequisites: BY 271, BY 212 or BY 311 or concurrent enrollment; ASH 400 or AHS 500. 5 hours. (Also MT 325)

CLS 600. Quality Management in Clinical Laboratory Markets. -- TQM/CQI change management practices, comparison and contrast to scientific management theory, principles, practices, tactics and evaluation of practices which support performance improvement for individuals, groups, and organizational business unit performance; quality management (QM) elements and interrelationships intended to achieve internal and external customer satisfaction; tactics supportive for implementation and internalization of internal support structures needed by internal customers so that commitment to improving personal competencies in knowledge, skills, abilities, service behaviors and intended performance achievement are more likely to occur; practices needed to achieve internal and external customer satisfaction and customer value/retention behaviors. Prerequisite: permission of instructor. 3 hours.

CLS 601. Designing Effective Laboratory Medicine Services. -- Application of organizational theory and behavior principles to operations of laboratory medicine services; structural, contextual, and system/processes factors that impact delivery of services; outcomes to include tactic applications needed for maximizing personal and organizational performance behaviors and results; analysis of strategies and tactics for achieving exceptional and evolving service relationships with internal and external customers. Prerequisite: permission of instructor. 3 hours.

CLS 602. Managing Clinical Laboratory Financial and Cost Accounting Operations. --Clinical laboratory approach to cost accounting, project management principles, reimbursement and fee determination mechanisms, budgeting practices, performance...
indicators/ratios, lease vs. buy decision criteria, and micro-costing practices linked with quality or performance management, legislation/regulations, external stakeholders, utilization management, billing practices, fraud and abuse/compliance practices, outcomes cost analysis models and factors influencing cost accounting practices in clinical laboratory and in vitro diagnostic industries. Prerequisite: permission of instructor. 3 hours.

CLS 603. Strategic Human Performance Technology for Laboratory Medicine Professionals.--Human performance technology and interventions to improve individual, unit, and organizational performance focusing on systems and processes; techniques for designing high performance work units and service culture, process control and optimization of clinical laboratories, material and process flow, management of specimens, equipment, products, informatics and fit of people, technology, and internal marketing practices. Prerequisite: permission of instructor. 3 hours.

CLS 605. Transfusion Service Management.--Regulatory and compliance issues; inspection and accreditation; Good Manufacturing Practices (GMP); historical perspective and future directions; basic concepts of management and management theory; legal and employment issues; personnel interview, selection, discipline, competency assessment, and performance management; ethical issues; quality assessment, management, and improvement; blood bank computer systems; budget, financial management, and cost assessment. Prerequisite: permission of instructor. 3 hours.

CLS 606. Advanced Immunology Clinical Practice.--Directed clinical practice: laboratory procedures and methods of evaluation and monitoring organ function, disease presence and progression, therapy; instrumentation, quality assurance practices; safety. Prerequisites: CLS 525 and permission of instructor. 1 hour.

CLS 607. Advanced Chemistry Clinical Practice.--Directed clinical practice: laboratory procedures and methods of evaluating and monitoring organ function, disease presence and progression, therapy; instrumentation, quality assurance practices; safety. Prerequisites: MT 520 and permission of instructor. 3 hours.

CLS 608. Advanced Hematology Clinical Practice.--Directed clinical practice: laboratory procedures and methods of evaluating and monitoring organ function, disease presence and progression, therapy; instrumentation, quality assurance practices; safety. Prerequisites: MT 340 and permission of instructor. 3 hours.

CLS 609. Advanced Immunohematology Clinical Practice.--Directed clinical practice: laboratory procedures and methods of evaluating and monitoring organ function, disease presence and progression, therapy; instrumentation, quality assurance practices; safety. Prerequisites: MT 430 and permission of instructor. 2 hours.

CLS 610. Advanced Technology Assessment.--Analysis of technology assessment information for test methods and instruments utilized in diagnostic laboratory medicine services; experience with determining and evaluating performance characteristics and clinical utility information for specific diagnostic test procedures; application of quality management practices to establish the diagnostic accuracy of products sold and to
establish process quality for services delivered; application of critical thinking skills to evaluate methodological and substantive validity of correlation and evaluation studies relevant to laboratory medicine practices. Prerequisite: BST 601-602, CLS 693, and permission of instructor. 3 hours.

**CLS 612. Advanced Microbiology Clinical Practice.** --Directed clinical practice: laboratory procedures and methods of evaluating and monitoring organ function, disease presence and progression, therapy; instrumentation, quality assurance practices; safety. Prerequisites: MT 336 and permission of instructor. 3 hours.

**CLS 620. Applications of Educational Methodology.**--Curriculum and course development and implementation, objectives, application of learning theory to educational strategies, laboratory teaching techniques; preparing a teaching laboratory budget, observation and supervised practice teaching, measurement and evaluation, presentation techniques. Prerequisite: permission of instructor. 1-3 hours.

**CLS 625. Principles of Blood Cell and Bone Marrow Counting.** -- Bone marrow aspirate and biopsy preparation and visual examination; review of normal and disease morphology; determination of bone marrow cellularity and myeloid:erythroid ratio. Prerequisite: permission of instructor. 1 hour.

**CLS 630. Advanced Hemostasis.**--In-depth discussion of the plasma coagulation system and cellular systems comprising hemostasis; pathophysiology and hemostasis laboratory diagnosis and case management of congenital and acquired thrombotic and hemorrhagic disorders; quality and efficacy issues affecting hemostasis laboratory testing. Prerequisite: permission of instructor. 1-2 hours.

**CLS 631. Advanced Hematology.**--Structure and function of bone marrow, spleen, and lymphatic system; stem cell differentiation, hematopoiesis, erythrocyte kinetics; laboratory diagnosis and case management of acute and chronic leukemias, myeloproliferative disorders, myelodysplastic syndromes, anemias; application of cell population scattergrams and phenotyping; quality and efficacy issues affecting hematology laboratory testing. Prerequisite: MT 340 and permission of instructor; corequisite: CLS 632. 2 hours.

**CLS 632. Advanced Hematology Laboratory.**--Laboratory sessions coordinated with CLS 631; myelogenous cell line, abnormalities and inclusions; erythrocyte structural changes; lymphocytic cell line, abnormalities and inclusions; erythrocyte maturation abnormalities; stains and cell markers used in classification of neoplasias. Prerequisite: AHS 500 and permission of instructor; corequisite: CLS 631. 1 hour.

**CLS 637. Emerging Diagnostic Technologies.**--Emerging diagnostic technologies for use in clinical laboratories, including methods for molecular microbiology, oncology, hematology, genetics, and identity testing; flow cytometry, automation, and robotics. Review of rapid tests and new in vitro methodologies; economic factors; regulations and licensing issues; accreditation criteria; and social, ethical, and legal issues associated with emerging in vitro diagnostic technologies. Prerequisite: permission of instructor. 2 hours.

**CLS 642. Infectious Disease Principles.**--Microbial virulence factors,
host defense mechanisms, and methods of transmission; major clinical syndromes, infectious diseases and their etiologic agents with focus on microbial detection and/or isolation, identification of isolates and antimicrobial studies; issues of quality and performance management, resources utilization, and role of clinical microbiology laboratories/laboratory practitioners. Prerequisite: MT 336 and permission of instructor. 3 hours.

CLS 643. Microbial Epidemiology Principles.--Epidemiology principles related to special host infections; notifiable diseases; surveillance methods, nosocomial infections; infection control practices; antimicrobial resistance; emerging infectious diseases' prevention strategies and bioterrorism issues. Prerequisite: permission of instructor. 3 hours.

CLS 650. Immunology.--Antigens, antibodies, cytokines; cellular and humoral immune response; genetics of immune system; complement; phagocytosis; adhesion molecules; major histocompatibility complex; antigen presentation and T and B cell activation; mucosal immunology; transplantation. Prerequisite: permission of instructor. 1 hour.

CLS 663. Blood Transfusion Therapy.--Red cell metabolism, survival, and preservation; collection of blood for allogeneic and autologous transfusion; blood component preparation, storage, therapy, and indications for transfusion; physiology of blood loss and transfusion replacement; use of blood substitutes, immunomodulation by transfusion; immune mechanism of red cell destruction; other adverse effects of transfusion; immunology of hepatitis, HIV and other transfusion-transmitted infections; bone marrow and peripheral blood stem cell transplant; transfusion for oncology, pediatric neonatal, obstetric, and transplant patients; hemolytic disease of newborn. Prerequisite: permission of instructor. 3 hours.

CLS 664. Advanced Immunohematology.--Red cell blood group systems: antigens and antibodies, phenotypes, molecular biology, immunogenetics, biochemistry, serology and clinical significance of antibodies; parentage testing; auto antibodies; drug induced red cell sensitization; advanced techniques for problem solving; case studies. Prerequisite: permission of instructor. 3 hours.

CLS 675. Advanced Clinical Chemistry.--Method evaluation; nutrition and wellness assessment, endocrinology evaluation, reproductive and pregnancy monitoring; pharmacokinetics, therapeutic drug monitoring and drugs of abuse; lipids; heme synthesis and evaluation; organ system evaluation and application of total testing process to error reduction; preparation for accreditation; nanotechnology, reference intervals and biological variation. Prerequisite: MT 320 and permission of instructor. 3 hours.

CLS 684. Clinical Practicum.--Directed clinical practice; advanced laboratory procedures and methods; quality control systems, preventive maintenance, problem solving, safety. Prerequisite: permission of instructor. 1-6 hours.

CLS 686. Special Topics in Clinical Laboratory Sciences.--Selected advanced topics of current scientific, clinical, and professional importance; specific topics designed to meet student need and interest. Prerequisite: permission of instructor. 1-4 hours.
CLS 688. Managing and Marketing Laboratory Medicine Services.-- Marketing management methods and evaluation of marketing tactics; examination of service management principles and elements of customer service-driven organizations in managed care/integrated systems environment; skills, abilities, and knowledge necessary for creating a service-, customer-, and market-oriented clinical laboratory industry. Prerequisite: permission of instructor. 3 hours.

CLS 692. Immunohematology Seminar.--Current clinical, administrative, professional, and research developments in immunohematology and transfusion medicine. Prerequisite: permission of instructor. 1 hour.

CLS 693. Scientific Publications Analysis.--Review and scientific critique of current literature related to laboratory medicine, overview of research design and interpretation of statistics, sources of publication journals and government documents, content and style of scientific paper. Prerequisite: biostatistics and permission of instructor. 3 hours.

CLS 698. Master's Level Non-Thesis Research.-- Prerequisite: permission of instructor. 1-6 hours.

CLS 699. Master's Level Thesis Research.--Implementation of research. Prerequisite: permission of instructor. 1-6 hours.