Prof. Program 23 courses (83 credits)

**CLS 100 Introduction to Clinical Laboratory Science (1-3-2)**
Orientation to the theory and practice of all aspects of the clinical laboratory science profession. The history of clinical laboratory science, professional organizations and career opportunities are discussed.

**CLS 107, CLS 207, CLS 307, CLS 407 Seminar**
(Hours to be arranged each term.)

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**CLS 412 (2-0-2) Pathophysiology**
Lecture course reviewing processes that underlie many different disease states and health deviations. The study of the most common disease processes in humans and their correlation with laboratory findings are explored.

**CLS 415 Clinical Chemistry I (6-0-6)**
The theory, practical application and technical performance of chemical procedures. Fundamentals of quantitative chemical analysis in the determination of endogenous and exogenous substances in body fluids such as blood, urine, spinal fluid, amniotic fluid and ascites. Emphasis areas will encompass amino acids, proteins, carbohydrates, lipo-proteins, lipids, enzymes, renal and liver functions analytes, GI function related analytes, electrolytes, trace elements, hemoglobin and porphyrins, and hormones, bone metabolism, nutrition, pregnancy and fetal development analytes, and geriatric considerations.

**CLS 416 Clinical Chemistry II (2-0-2)**
The theory, practical application and technical performance of chemical procedures. Fundamentals of quantitative chemical analysis in the determination of endogenous and exogenous substances in body fluids such as blood, urine, spinal fluid, amniotic fluid and ascites. Emphasis areas will encompass therapeutic drug monitoring, toxicology, and method evaluation.
Prerequisite: CLS 415.

**CLS 420 Clinical Immunology (3-3-4)**
Lecture/laboratory coverage of human immunity, including innate and adoptive immunity, immune system organs, tissues, and activation, immunoglobulin and complement biochemistry, and test methods used in the clinical lab to assess human immune response in health and in various disease states.
Co-requisite: CLS 432.

**CLS 422 Molecular Methods (1-3-2)**
Coverage of molecular techniques used in the clinical laboratory to diagnose disease. Topics covered include principles of molecular biology, nucleic acid isolation, purification, amplification, quantitation, and discrimination. Specimen collection/handling, ethical issues and molecular lab operations are also covered.
Prerequisites: CLS 415, CLS 420, CLS 447

***CLS 424 Hemostasis (2-3-3) NEW***
Lecture/lab coverage of the mechanisms of hemostasis and basic pathophysiology of hemostatic disorders. Students perform laboratory procedures pertaining to hemostasis, interpret results and correlate with other laboratory data to identify disease states.

***CLS 432 Foundations of Clinical Laboratory Science I (4-0-4) NEW***
The first of two courses covering essential practices of clinical laboratory science. Emphasis on safety, statistical approaches to data evaluation, problem-solving, systems of measurement, troubleshooting, and instrumentation.

**CLS 442 Hematology I (4-6-6)**
Lecture/lab coverage of normal development and function of blood cells. Students learn to evaluate normal and abnormal blood cell morphology through microscopic examination of blood smears. Students perform laboratory procedures pertaining to hematology.

**CLS 443 Immunohematology I (3-3-4)**
Lecture/lab coverage of immunohematology with practical application in the contemporary blood bank laboratory. Topics include blood groups biochemistry, genetics, and immunology, test methods and transfusion practices including donor selection, component preparation, quality management and compliance issues.
Prerequisites: CLS 420, CLS 424

**CLS 444 Microbiology I (4-6-6)**
Lecture/lab coverage of human bacterial pathogens seen in the clinical laboratory including gram positive and gram negative cocci, gram positive and gram negative bacilli, and anaerobes. Principles and methods of clinical microbiology laboratory diagnosis of bacterial diseases are studied.

**CLS 445 Microbiology II (3-3-4)**
Lecture/lab coverage of human microbial pathogens seen in the clinical laboratory including spirochetes, mycobacteria, chlamydia, rickettsia, fungi, and viruses. Principles and methods of clinical microbiology laboratory diagnosis of diseases caused by these microbes are studied.

**CLS 446 Microbiology III (2-6-4)**
Lecture/lab coverage of normal and pathogenic parasitic organisms of man with emphasis on organisms seen in a clinical laboratory. Principles and methods of clinical microbiology laboratory diagnosis of infections and diseases caused by these organisms are studied.

**CLS 447 Practicum: Chemistry (0-18-6)**
Principles of chemical analysis, quality control, laboratory utilization, and safety. Hands-on exercises, demonstrations, and computer tutorials illustrating chemical analysis and data evaluation in a clinical chemistry laboratory. Discussion of case studies using problem-solving methods to analyze and interpret relevant chemical analysis data.
Corequisite: CLS 415

**CLS 448 Infectious Serology (0-3-1)**
Clinical laboratory diagnosis of infectious disease by serological test methods is studied.
Prerequisites: CLS 420, CLS 432

**CLS 449 Practicum: Urinalysis (1-3-1)**
Study of urine with emphasis on urinalysis techniques, renal function, physical examination, chemical examination, microscopic examination, renal disease, and metabolic disorders. Methods include microscopy, discussion, case histories, computer tutorials, hands-on exercises, demonstrations, problem solving, and interpretation of results.

**CLS 452 Hematology II (4-3-5)**
Comprehensive study of the pathophysiology of hematological disorders. Students perform microscopic examination of blood films, interpret results and correlate with other laboratory data to identify disease states.
Prerequisite: CLS 442

**CLS 453 Immunohematology II (1-3-2)**
Continued study of immunohematology emphasizing clinical decision-making and problem-solving related to blood banking and transfusion therapy practices.
Prerequisite: CLS 443

**CLS 457 Practicum: Advanced Chemistry/Immunology Techniques (2-0-2)**
Directed study, review, and demonstration of advanced methods and instruments in use in clinical or research laboratories. These may include, but not be limited to tissue typing, molecular methods, automated systems, flow cytometry, and chromatographic methods.
Co-requisite: CLS 448.

**CLS 462 Foundations of Clinical Laboratory Science II (1-3-2)**
The second of two courses covering essential practices of clinical laboratory science. Emphasis on specimen collection, quality assurance, principles and application of ethics, professionalism, lab management, education techniques, and research.
Prerequisite: CLS 432

**CLS 470 Chemistry and Immunology Externship (0-12-4)**
Practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical chemistry/immunology laboratory and further develop discipline-specific competency.
Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

***CLS 471 Hematology Externship (0-12-4)***
Practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical hematology laboratory and further develop discipline-specific competency.
Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

***CLS 472 Microbiology Externship (0-12-4)***
Practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical Microbiology laboratory and further develop discipline-specific competency.
Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

***CLS 473 Immunohematology Externship (0-12-4)***
Practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary blood bank laboratory and further develop discipline-specific competency.
Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.