

# BIOMEDICAL LABORATORY SCIENCE (BLS)

---

## **BLS 1100 - Foundations of Medical Laboratory Science**

### **Credit(s): 2 Credits**

This course introduces students to medical science with an emphasis on Clinical Laboratory Science. Content focuses on major sub-specialties of medical laboratory science including chemistry, hematology, microbiology, urinalysis, immunology and blood banking. Identification and exploration of research opportunities, career options and volunteering services are also covered. Teaching modalities include lectures, case studies and discussion of laboratory testing in disease diagnosis.

**Corequisite(s):** BLS 1150

## **BLS 1150 - Foundations of Medical Laboratory Science Lab**

### **Credit(s): 1 Credit**

This laboratory course is a supplement to the Foundations of Medical Laboratory Science lecture course (BLS 1100) and serves to reinforce the basic concepts through hands-on laboratory testing. Students will perform a variety of routine clinical laboratory tests to solve patient cases. Basic principles of testing methods, laboratory techniques and interpretation of laboratory results will be covered.

**Corequisite(s):** BLS 1100

## **BLS 1850 - Research**

### **Credit(s): 1-3 Credits (Repeatable for credit)**

This experiential course provides the opportunity to familiarize students with basic principles of research design, data collection, data analysis, and hypothesis testing. In consultation with a faculty mentor, the student selects a research project and begins the preliminary activities associated with developing a research question to include searching the literature, participation in grant, IRB and animal control protocols, procedure writing and training in research techniques. Experimentation and data collection may begin as time permits. Students are required to meet with their faculty mentor on a regular basis during the semester.

**Attributes:** Special Approval Required

## **BLS 2850 - Research**

### **Credit(s): 1-3 Credits (Repeatable for credit)**

This experiential course provides the opportunity to apply the basic principles of research design, data collection, data analysis, and hypothesis testing to a research study. In consultation with a faculty mentor, the student will begin performing research technique and data collection on the research project selected. Students are required to meet with their faculty mentor on a regular basis during the semester.

**Prerequisite(s):** BLS 1850 with a grade of C or higher

**Attributes:** Special Approval Required

## **BLS 3110 - Urinalysis & Body Fluids**

### **Credit(s): 2 Credits**

Course focuses on the basic physiology of the kidney, mechanism of urine formation, and urine composition. The formation, function, analysis and evaluation of various other body fluids will be discussed to include but not limited to cerebrospinal fluid, synovial fluid, pleural, pericardial, peritoneal, and seminal fluids. Content will focus on the principles and clinical significance of the various procedures used in testing urine and body fluids and their role in disease diagnosis.

**Prerequisite(s):** BIOL 3020 with a grade of C- or higher

## **BLS 3850 - Research**

### **Credit(s): 1-3 Credits (Repeatable for credit)**

This experiential course provides the opportunity to apply the basic principles of research design, data collection, data analysis, and hypothesis testing to a research study. In consultation with a faculty mentor, the student performs experiments and collects data to test the research hypothesis associated with the research project selected. Students are required to meet with their faculty mentor on a regular basis during the semester.

**Prerequisite(s):** BLS 2850 with a grade of C or higher

**Attributes:** Special Approval Required

## **BLS 4110 - Medical Biochemistry I**

### **Credit(s): 3 Credits**

Part one of a two-part course to study the biochemical principles as applied to clinical investigation of disease. Topics include but are not limited to: protein structure and function; enzyme kinetics; carbohydrate and lipid metabolism; fluid and electrolyte balance. Medical chemistry testing will be applied to the evaluation of specific organ systems diseases.

**Prerequisite(s):** BIOL 3020 with a grade of C- or higher; CHEM 2410 with a grade of C- or higher

### **Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Science or Medical Laboratory Science.

## **BLS 4120 - Medical Biochemistry II**

### **Credit(s): 2 Credits**

Continuation of BLS-4110 focusing on biochemical principles and their application to the clinical investigation of disease. Topics include but are not limited to: trace elements, acid base balance, endocrinology, therapeutic drug monitoring and toxicology.

**Prerequisite(s):** BLS 4110 with a grade of C or higher

### **Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Science or Medical Laboratory Science.

## **BLS 4130 - Principles & Techniques in Molecular Biology**

### **Credit(s): 1 Credit**

Course provides an introduction to principles and applications of molecular biology to include nucleic acid biochemistry as well as basic molecular techniques to include but not limited to isolation and analysis of DNA and RNA, hybridization, amplification, sequence analysis, mutation detection, gel electrophoresis and array technology. Course includes the application of concepts and principles to the diagnosis of human disease.

**Prerequisite(s):** BIOL 3020 with a grade of C- or higher

### **Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Science or Medical Laboratory Science.

**BLS 4210 - Hematology**

**Credit(s): 4 Credits**

Content emphasizes the physiology of the blood forming organs and the maturation and function of their cellular products. Routine and confirmatory laboratory testing will be discussed to include purpose of test, performance of test and interpretation of results. Discussions will involve the pathophysiology, evaluation and diagnosis of blood dyscrasias to include anemias, leukemias, lymphomas, myeloproliferative and myelodysplastic conditions and other blood diseases using laboratory test results.

**Prerequisite(s):** BIOL 3020 with a grade of C- or higher

**Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Sci or Medical Laboratory Science.

**BLS 4220 - Hemostasis and Thrombosis**

**Credit(s): 2 Credits**

Principles and laboratory analysis of normal hemostasis and fibrinolysis will be presented to include blood vessel, platelet, and coagulation protein function. Discussions will include the pathophysiology of bleeding conditions, thrombotic disorders, and thrombophilia, and their diagnosis using laboratory results. The physiology and laboratory monitoring of anticoagulant therapy will be discussed.

**Prerequisite(s):** BIOL 3020 with a grade of C- or higher

**Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Sci or Medical Laboratory Science.

**BLS 4310 - Immunohematology**

**Credit(s): 3 Credits**

This course introduces basic immunologic and genetic principles governing blood groups and blood transfusion practice. Blood group systems, antibody identification, compatibility testing, and transfusion therapy are covered.

**Prerequisite(s):** (BLS 4410 with a grade of C or higher or BLS 4411 with a grade of C or higher)

**Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Sci or Medical Laboratory Science.

**BLS 4411 - Fundamentals of Immunology**

**Credit(s): 2 Credits**

Course focuses on the human immune system to include but is not limited to theories of innate, humoral and cellular immunity, development and functions of T-cells and B-cells, the antibody response, the genetics of antibody diversity.

**Prerequisite(s):** BIOL 3020 with a grade of C- or higher

**BLS 4420 - Medical Immunology**

**Credit(s): 2 Credits**

The course will apply concepts of basic immunology to human disease to include concepts of hypersensitivity, immune deficiencies, transplantation and tumor immunology. Lecture presentations of the recent advances in immunology that are relevant to transplantation, infectious disease, tumor immunology and nutrition.

**Prerequisite(s):** BLS 4411 with a grade of C or higher

**BLS 4510 - Medical Microbiology**

**Credit(s): 4 Credits**

Content focuses on microorganisms of pathologic importance to include bacteria and viruses with an overview of parasites and fungi involved in human disease. Included are discussions on structure, molecular biology, molecular diagnostics, metabolism, growth, replication, food borne illnesses, current topics and emerging concerns. Pathogenicity, epidemiology, diagnosis and laboratory identification of important groups of human pathogenic bacteria along with modes of action of selected antimicrobics and chemotherapeutic agents are also discussed. In addition to the prerequisites, BIOL 3020 is recommended.

**Prerequisite(s):** (BIOL 1100 with a grade of C- or higher or BIOL 1240 with a grade of C- or higher); CHEM 1120 with a grade of C- or higher

**BLS 4610 - Research Design, Critique & Presentation**

**Credit(s): 3 Credits**

"This course introduces students to research and includes discussion and assignments relevant to biomedical research design and performance. Topics include but are not limited to critical reasoning, safety and ethical components of research performance, literature review and critique, scientific writing and principles of effective presentations.

**Prerequisite(s):** MATH 1300 with a grade of C- or higher

**Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Sci or Medical Laboratory Science.

**Attributes:** Special Approval Required

**BLS 4850 - Research**

**Credit(s): 3 Credits** (Repeatable for credit)

This experiential course provides the opportunity for students to apply the basic principles of research design, data collection, data analysis, and hypothesis testing to a research study. In consultation with a faculty mentor, the student performs experiments and collects data to test the research hypothesis associated with the research project selected. The course culminates in a publication ready manuscript. Students are required to meet with their faculty mentor on a regular basis during the semester.

**Prerequisite(s):** BLS 3850 with a grade of C or higher

**Restrictions:**

Enrollment is limited to students with a major in Investigative Medical Sci or Medical Laboratory Science.

**Attributes:** Special Approval Required

**BLS 5125 - Introduction to Clinical Laboratory Medicine**

**Credit(s): 3 Credits**

The purpose of the course is to discuss the most common laboratory tests ordered, performed, and interpreted in the areas of Clinical Chemistry, Hematology, Immunology, Transfusion Medicine (Blood Bank), Hemostasis, Medical Microbiology, and Urinalysis. Discussions will include the purpose of each test, test ordering practices, relationship to disease pathophysiology, result interpretation, and how test results are included in diagnostic algorithms. Physician Assistant majors only.

**Restrictions:**

Enrollment limited to students in the PA12 program.