BIOMEDICAL LABORATORY DIAGNOSTICS BLD

Biomedical Laboratory Diagnostics Program
College of Natural Science

121 Survive and Thrive Freshman Seminar
Fall, Spring. 1(1-0) R: Open to freshmen or sophomores in the Biomedical Laboratory Science Major or in the Lyman Briggs Biomedical Laboratory Science Coordinate Major or approval of department.
Academic skills and communication skills with an emphasis on scientific communication, professional behavior. History of the medical and the medical laboratory professions, and campus resources for a successful college experience.

204 Mechanisms of Disease
Fall, Spring, Summer. 3(3-0) P: PSL 310 or PSL 431 R: Not open to seniors. SA: MT 204
Pathophysiological mechanisms of diseases. Selected applications to organ system pathology.

213L Clinical Laboratory Methods
Fall, Spring, Summer. 2(2-2) P: (CEM 141 and CEM 161) or (LB 171 and LB 171L) RB: BS 171 R: Open to students in the Human Biology Major or in the Biomedical Laboratory Science Major or in the Lyman Briggs Biomedical Laboratory Science Coordinate Major. SA: MT 213, BLD 213
Lab safety and standards of good laboratory practice including specimen handling and processing. Application of technologies and techniques to the performance of clinical diagnostic testing.

214L Biomedical Laboratory Research Techniques
Summer. 2(1-3) P: MTH 103 or MTH 103B or MTH 116 or MTH 124 or approval of department
Basic techniques, skills and safety in biomedical research. Ethical conduct of research and regulatory principles such as Good Laboratory Practice. Maintaining a research notebook for legal and intellectual property purposes. Offered second half of semester.

221 Academic Preparation for Medical Laboratory Science I
Fall. 1(1-0) P: BLD 121 R: Open to sophomores or juniors or seniors in the Biomedical Laboratory Science Major. Approval of department.
Academic skill development including time management, self-efficacy, short and long-term goal development, academic communication and personal alignment with Medical Laboratory Science profession.

302 Clinical Chemistry
Spring. 2(2-0) P: BLD 204 and BLD 313
Correlation of common medical laboratory testing and associated disease states, including comprehensive metabolic panel, lipid panel, thyroid panel, urinalysis and drugs of abuse screening.

313 Quality in Clinical Laboratory Practice
Fall, Spring. 3(3-0) P: ((BLD 121 or concurrently) and BLD 213L) and ((STT 201 or STT 200 or STT 231) and completion of Tier I writing requirement) RB: PHY 232 SA: BLD 414, BLD 417
Concepts and principles of clinical laboratory analysis and the statistical evaluation of the data produced as related to quality.

314L Advanced Clinical Laboratory Methods
Fall, Spring. 1(0-3) P: BLD 213L and (BLD 324 or concurrently) RB: BLD 204 R: Open to students in the Biomedical Laboratory Science Major or in the Lyman Briggs Biomedical Laboratory Science Coordinate Major.
Diagnostics assays within the clinical laboratory including hematology, immunohematology, coagulation, urinalysis, and molecular diagnostics. Data interpretations and problem solving skills.

321 Academic Preparation for Medical Laboratory Science II
Fall. 1(1-0) P: BLD 121 RB: BLD 221 R: Open to juniors or seniors in the Biomedical Laboratory Science Major. Approval of department.
Academic and professional skill development including strategies to succeed in medical laboratory science core curriculum, career advancement opportunities in medical laboratory professions, professional identity, and effectively communicating your skills in applications, personal statements, and professional interviews.

324 Hematology and Hemostasis
Fall. 3(3-0) P: BLD 204 or concurrently SA: MT 324
Physiology and biochemistry of normal hematologic and hemostatic systems. Principles of diagnostic assays to detect diseases affecting those systems.

365 Medical Microbiology
Spring. 3(3-0) Interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. P: (BS 161 and CEM 141) and (MMG 201 or MMG 301) Not open to students with credit in MMG 463.
Laboratory diagnosis, disease and epidemiology of the most common bacterial, viral, fungal and parasitic pathogens and concepts in infectious disease control, prevention and treatment.

365L Medical Microbiology Laboratory
Spring. 1(0-2) Interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. P: (MMG 365 or concurrently) and (MMG 201 or MMG 301) Not open to students with credit in MMG 464.
Practical experience in safely and accurately performing standard clinical microbiology tests to diagnose disease-causing microbes.

366 Infectious Diseases of East Africa
Summer. 4(1-6) Summer: Africa. P: (BLD 213L) or BLD 214L or (CEM 162 and BS 171) or (LB 145 and LB 172L) RB: Pre-health professional undergraduate students with junior or senior status. R: Approval of department.
Biology and laboratory diagnosis of the most common infectious disease of the region. Health disparities and healthcare system organization.

402 Advanced Clinical Chemistry
Fall. 4(4-0) P: (BLD 302 and BMB 401) or (BLD 302 and BMB 461 and BMB 462)
Differences in clinical laboratory testing results between normal and diseased populations. Metabolic and endocrine systems, acquired and inherited diseases, therapeutic drug monitoring and toxicology.

424 Advanced Hematology and Hemostasis
Spring. 2(2-0) P: (BLD 324 and BMB 401) or (BLD 324 and BMB 461 and BMB 462) RB: (BLD 430 and BLD 434 and (BLD 435 or concurrently)) and (PSL 250 or PSL 310) R: Open to undergraduate students in the Biomedical Laboratory Diagnostics Program. SA: MT 422, MT 424
Etiology and pathogenesis of diseases of the hematologic and hemostatic systems including anemias, leukemias, and hemophilias. Diagnostic testing for such diseases.

424L Advanced Hematology, Hemostasis and Urinalysis Laboratory
Spring. 1(0-3) P: (BLD 314L and BLD 324) and (BLD 424 or concurrently) R: Open to undergraduate students in the Biomedical Laboratory Diagnostics Program. SA: MT 424L, MT 423
Specialized and advanced assays used in the diagnosis of diseases of the hematological, hemostatic, and urinary systems.

430 Molecular Diagnostics
Spring. 2(2-0) P: (BS 161 or LB 145 or BS 181H) and (BLD 204 and BLD 313) SA: MT 430
Concepts and principles of molecular analysis applied to medical diagnostics and related applications.

430L Molecular Diagnostics Laboratory
Fall. 1(0-3) P: BLD 430 R: Open to undergraduate students in the Biomedical Laboratory Diagnostics Program or approval of department.
Molecular technologies with emphasis on clinical and diagnostic applications.

434 Clinical Immunology
Fall, Spring, Summer. 3(3-0) P: PSL 250 or PSL 310 or PSL 432 RB: (MMG 201 or MMG 301) and BLD 204 SA: MT 432, MT 434 Not open to students with credit in MMG 451.
Concepts of innate and adaptive immunity. Immunodeficiency and autoimmunity. Principles and applications of immunoassays in medical laboratories.

435 Immunohematology
Spring. 2(3-0) P: (BLD 313) and (BLD 434 or MMG 451) SA: MT 435, MT 432
Principles and practice of transfusion medicine including blood typing. Offered first ten weeks of semester.

435L Immunohematology Laboratory
Spring. 1(0-3) P: BLD 314L and BLD 435 R: Open to undergraduate students in the Biomedical Laboratory Diagnostics Program. SA: MT 433, BLD 433
Methods of blood typing and pre-transfusion testing.

439 Histocompatibility and Immunogenetics
Spring. 1(1-0) P: BLD 434 or MMG 451 RB: BLD 204 and BLD 435 R: Open to juniors or seniors in the College of Natural Science or in the Lyman Briggs College.
The theory and principles of histocompatibility and immunogenetics as applied to transplant medicine.

443 Introduction to Laboratory Information Systems
Spring. 3(3-0) P: (CSE 201 or CSE 231) and (MTH 124 or MTH 132) and BLD 213L R: Open to students in the Information Technology Minor.
Purpose and function of information systems components used in medical laboratories. Practical applications of system selection, validation, maintenance, problem resolution and report generation.

444 Laboratory Information Technology Practicum and Project Management
Summer. 3(0-40) P: BLD 443 and ITM 311 RB: Biomedical Laboratory Science major. R: Open to students in the Information Technology Minor. Approval of department.
Gain experience in using, maintaining and managing quality of a laboratory information system at a clinical or public health laboratory site. Project management principles and application.

445 Medical Laboratory Management
Fall. 1(1-0) P: BLD 456 or concurrently R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department.
Management of clinical laboratories through adherence to laws and regulations, developing financial and budgeting tools, and assuring a competent workforce.

446 Immunobiology of Neoplasia
Spring. 1(1-0) P: BLD 434 or MMG 451 RB: BLD 204 and BLD 435 R: Open to juniors or seniors in the College of Natural Science or in the Lyman Briggs College.
The biology of neoplastic cells (cancers, leukemias, lymphomas), the immune response to neoplasias, and immunotherapy of cancer.

447 Immunomodulation and Immunotherapy
Spring. 1(1-0) P: BLD 434 or MMG 451 RB: BLD 204 and BLD 435 R: Open to juniors or seniors in the College of Natural Science or in the Lyman Briggs College.
Current applications of Immunology understanding in the immunomodulation and immunotherapy of infectious disease, immunodeficiencies, autoimmune disease, and cancers.

452L Immunodiagnostics Laboratory
Spring. 1(0-3) P: BLD 314L and BLD 434 R: Open to students in the Biomedical Laboratory Science Major or approval of department. Not open to students with credit in BLD 852.
Performance of immunopurifications, in vitro diagnostic assays and basic flow cytometry. Data analysis and quality control evaluation.

456 Medical Laboratory Professionalism (W)
Fall, Spring. 2(2-0) P: (BLD 121 and BLD 313) and completion of Tier I writing requirement RB: (BLD 302 and BLD 324 and BLD 435) and (MMG 201 or MMG 301) R: Open to seniors in the Biomedical Laboratory Diagnostics Program.
Basic principles and concepts in education and professional behavior in clinical laboratories. Systematic approach to instructional design, delivery and evaluation. Principles of leadership.

460 Advanced Molecular Diagnostics
Fall. 2(2-0) P: BLD 430 R: Open to students in the Lyman Briggs College or in the College of Natural Science.
Common and specialized molecular diagnostic technologies applied to medical diagnostics and related applications.

465 Advanced Medical Microbiology
Fall. 3(3-0) Interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. P: MMG 365 Not open to students with credit in MMG 463.
Advanced laboratory diagnosis, epidemiology, and prevention of infectious diseases using an anatomical system specimen approach to study a comprehensive set of human pathogens and microbiota.

465L Advanced Medical Microbiology Laboratory
Fall. 2(0-6) Interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. P: MMG 365L and (MMG 465 or concurrently) Not open to students with credit in MMG 464. C: MMG 465 concurrently.
Practical experience in safely and accurately performing standard clinical microbiology tests to process clinical specimens, identify pathogens and perform and interpret susceptibility testing.

471L Advanced Clinical Chemistry Laboratory
Fall, Spring, Summer. 3 credits. P: CEM 333 R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department. SA: MT 471, BLD 471
Application and integration of theory and technical skills in clinical chemistry and biochemistry.

473L Advanced Clinical Hematology and Body Fluids Laboratory
Fall, Spring, Summer. 3 credits. P: BLD 424L R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department. SA: MT 473, BLD 473
Application and integration of theory and technical skills in hematology, hemostasis, and body fluid analysis.

475L Advanced Clinical Immunology and Immunohematology Laboratory
Fall, Spring, Summer. 2 credits. P: BLD 435L R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department. SA: MT 475, BLD 475
Application and integration of theory and technical skills in immunology and immunohematology.

477L Advanced Clinical Microbiology Laboratory
Fall, Spring, Summer. 3 credits. P: MMG 465L R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department. SA: MT 477, BLD 477
Application and integration of theory and technical skills in clinical microbiology and infectious disease.

479 Professional Behavior in Medical Laboratory Science
Fall, Spring, Summer. 1(0-2) P: (BLD 445 and BLD 456) and ((BLD 471L or concurrently) and (BLD 473L or concurrently) and (BLD 475L or concurrently) and (BLD 477L or concurrently)) R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department. SA: MT 479
Application of professional behavior principles to practical experiences in medical laboratory science.

480 Medical Laboratory Science Examinations I
Fall, Spring, Summer. 1 credit. P: BLD 435L and BLD 402 and BLD 424L and MMG 465L R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department.
Medical laboratory science profession entry-level body of knowledge in clinical chemistry, hematology, hemostasis, body fluid analysis, immunology, immunohematology, and clinical microbiology. Integration of cognitive material with clinical laboratory test results.

481 Medical Laboratory Science Examinations II
Fall, Spring, Summer. 1 credit. P: BLD 435L and BLD 402 and BLD 424L and BLD 480 and MMG 465L R: Open to students in the Biomedical Laboratory Diagnostics Program. Approval of department.
Continuation of BLD 480.

495 Directed Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to students in the Biomedical Laboratory Science Major or in the Lyman Briggs Biomedical Laboratory Science Coordinate Major. SA: MT 495
Faculty directed study including assigned readings, reviews of appropriate scientific periodicals, research, and laboratory experience.

801 Biomedical Laboratory Diagnostics Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 2 credits in all enrollments for this course. SA: MT 801
Current research topics in clinical laboratory sciences.

805 Communication in the Sciences
Fall, Summer. 2(2-0)
Professional communication in clinical laboratory science, including article and proposal writing, thesis writing, posters, and presentations.

811 Fundamentals of Scientific Research
Fall. 1(1-0) R: Open to master's students in the Biomedical Laboratory Diagnostics Program. SA: MT 810
Best practices for the research enterprise. Ethical conduct of research. Critical evaluation of scientific literature.

815 Cell Biology in Health and Disease I
Spring. 2(2-0) RB: Undergraduate course in Biochemistry and Physiology.
Experience in a clinical laboratory
Principles and theories of cell biology and biochemistry are presented with a focus on applications to clinical pathology.

816 Cell Biology in Health and Disease II
Summer. 2(2-0) P: BLD 815 RB: Undergraduate course in biochemistry and physiology.
Experience in a clinical laboratory
Continuation of BLD 815.

830 Concepts in Molecular Biology
Fall, Spring. 2(2-0) Interdepartmental with Pathobiology and Diagnostic Investigation. Administered by Biomedical Laboratory Diagnostics. RB: One course in biochemistry or concurrently. SA: MT 830
Techniques and theories of molecular biology, nucleic acid synthesis and isolation, enzymatic digestion and modification, electrophoresis, hybridization, amplification, library construction, and cloning.

831 Clinical Application of Molecular Biology
Spring, Summer. 2(2-0) P: BLD 830 RB: Basic biochemistry, medical or research laboratory experience SA: MT 831
Molecular diagnostic principles. Diagnostic outcomes in traditional and non-traditional laboratory disciplines.

832 Molecular Pathology Laboratory
Summer. 2(0-4) P: BLD 831 or concurrently
Equipment operation, DNA extraction and measurement, electrophoresis, hybridization and transfers, amplification and detection including techniques and automated sequencing. Clinical applications.

835 Hemostasis, Thrombosis and Effective Resource Management
Fall. 3(3-0) RB: Background in hemostasis, thrombosis and blood product management.
Theories of coagulation, thrombosis and effective blood product management. Needs and particular stresses during an active bleeding crisis.

836 Adverse Transfusion Outcomes: Detection, Monitoring and Prevention
Spring, Summer. 2(2-0) RB: Medical technology and clinical laboratory sciences laboratory professionals.
Adverse transfusion outcomes (ATO) covering cause, methods of detection, monitoring paradigms and prevention.

837 Transfusion Service Operations and Management
Fall, Spring. 1(1-0) RB: Clinical transfusion service practical experience.
Management and operational practices needed to meet both the fiscal and regulatory oversight of a transfusion service.

838 Clinical Context of Blood Product Management
Fall. 1(1-0) RB: Experience in transfusion medicine
Effective blood product management in the context of high use, high demand clinical settings.

842 Managing Biomedical Laboratory Operations
Fall, Spring. 2(2-0) R: Open to graduate students or lifelong graduate students or approval of department. SA: MT 842
Integration of the roles of legislative, regulatory, technological and economic factors that influence the practice and management of biomedical laboratory operations.

844 Topics in Biomedical Laboratory Operations
Spring. 1(1-0) P: BLD 842 R: Open to graduate students or lifelong graduate students or approval of department. SA: MT 844
Current issues relevant to biomedical laboratory operations from an interdisciplinary perspective with an emphasis on efficient laboratory operations.

846 Decision Processes for Biomedical Laboratory Operations
Fall. 2(2-0) P: BLD 842 R: Open to master's students or lifelong graduate students or approval of department. SA: MT 846
Integrative case studies presented in a problem-based learning format. Strategies for decision-making in the operations of a biomedical laboratory. Cases integrate scientific principles, management principles and regulatory factors.

850 Concepts in Immunodiagnostics
Fall, Spring. 2(2-0) RB: An undergraduate course in biochemistry or cell biology. SA: MT 850
Immunology principles and theory applied to diagnostic evaluation of the host immune response during health and disease.

851 Clinical Application of Immunodiagnostic Principles
Spring, Summer. 2(2-0) P: BLD 850 SA: MT 851
Immunodiagnostic theories and principles applied to clinical assay development and method evaluation.

852 Immunodiagnostics Laboratory
Summer. 2(2-0) P: BLD 850
Performance of immunopurifications, in vitro diagnostic assays and basic flow cytometry. Data analysis and quality control evaluation.

853 Advanced Flow Cytometry
Summer. 2(2-0) P: BLD 850 and BLD 851 and (BLD 852 or concurrently) or approval of department
Flow cytometry systems, software and reagents. Data analysis and experimental design of complex flow cytometric assays. Flow cytometry applications in medicine and research.

854 Advanced Flow Cytometry Laboratory
Summer. 2(0-4) P: BLD 852 RB: Experience in Flow Cytometry R: Open to graduate students. C: BLD 853 concurrently.
Flow cytometry and analyses exercises that emphasize controls, reagent titrations, assay validation, determination of assay sensitivity, and assay development using 6 to 8 fluorochromes.

861 Emerging Infections, Emerging Technology
Fall. 2(2-0) P: MMG 365 or approval of department RB: Undergraduate degree in medical laboratory science, microbiology or epidemiology
Use of recent cases in infectious diseases to investigate the causes for disease emergence and the laboratory technologies used to identify the microbial causes, to describe epidemiology and to develop surveillance systems and prevention.

862 Advances in Diagnostic Microbiology
Spring of odd years, Summer of even years. 3(3-0) P: MMG 365 or approval of department RB: (MMG 465 or BLD 430) or similar coursework or equivalent experience. R: Open to graduate students.
Theoretical and applied clinical microbiology using MALDI-TOF, next generation sequencing, validation of new methods, and bioinformatics.

870 Clinical Mass Spectrometry Theory
Fall. 2(2-0) RB: One course in Biochemistry or concurrent.
The theory and principles of mass spectrometry. Principles of instrumentation, liquid and gas chromatography theory and data analysis as it applies to the clinical laboratory.

871 Applied Clinical Mass Spectrometry
Spring. 2(2-0) P: BLD 870 or approval of department RB: One course in protein chemistry or concurrent
Data interpretation and quality control in clinical mass spectrometry. Principles of sample preparation, platform selection, data analysis, and clinical applications as it applies to the clinical laboratory.

872 Clinical Mass Spectrometry Laboratory
Summer. 2(1-2) P: BLD 870 and BLD 871 or approval of department RB: One course in protein chemistry or concurrent enrollment in same.
Sample preparation, instrument operation, data interpretation, and instrument maintenance as it relates to the clinical practice.

890 Selected Problems in Clinical Laboratory Science
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open to graduate students in the College of Natural Science or in the Biomedical Laboratory Diagnostics Program or in the Clinical Laboratory Sciences Major or in the Biomedical Laboratory Science Major. SA: MT 890
Non-thesis research for Plan B master's students.

895 Projects in Biomedical Laboratory Operations
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to master's students in the Biomedical Laboratory Operations major or approval of department. SA: MT 895
Completion of a significant on-site project in cooperation with an industrial/clinical partner.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open to graduate students in the Clinical Laboratory Sciences major. SA: MT 899
Master's thesis research.