Preparation for a Health Professions

Biomedical Laboratory Diagnostics Program
College of Natural Science

120 Learning in the Biomedical Sciences
Fall. 1 credit. R: Open to freshmen or sophomores. SA: MT 120 Not open to students with credit in NSC 201 or NSC 202.

150 Preview of Biomedical Research
Spring. 1(1-0) Interdepartmental with Natural Science. Administered by Biomedical Laboratory Diagnostics. R: Open to freshmen or sophomores. SA: MT 150

204 Mechanisms of Disease
Spring. 3(3-0) P: BS 111 or LB 145 or BS 149H or BS 159H SA: MT 204
Pathophysiological mechanisms of diseases. Selected applications to organ system pathology.

213 Application of Clinical Laboratory Principles
Fall, Summer. 2(1-3) RB: BS 111L R: Open to students in the Clinical Laboratory Sciences major or in the Diagnostic Molecul- lar Science major or in the Human Biology major or in the Lyman Briggs School Medical Technology Coordinate Major or in the Medical Technology major. SA: MT 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.

220 Preparing for a Health Professions Career
Spring. 1(1-0) R: Open to sophomores or juniors. SA: MT 220
Development of skills needed for success in health professions careers. Historical, economic, sociological and ethical perspectives on the U.S. health professions with focus on medical laboratory careers.

324 Fundamentals of Hematology, Hemosta-sis, and Urinalysis
Fall. 3(3-0) P: (BS 111 or concurrently) or (LB 145 or concurrently) or (BS 149H or concurrently) or (BS 159H or concurrently) SA: MT 324
Physiology and biochemistry of normal hematologic, hemostatic, and urinary systems. Principles of diagnostic assays to detect diseases affecting those systems.

324L Introductory Laboratory in Hematology, Hemostasis and Urinalysis
Fall. 1(0-3) P: BLD 324 R: Open to students in the Clinical Laboratory Sciences major. SA: MT 423, MT 324L
Routine laboratory assays used to assess the health of the hematological, hemostatic, and urinary systems.

413 Advanced Biomedical Laboratory Diagnostics Laboratory
Spring. 1(0-3) P: BLD 213 and BLD 324 and BLD 434 and BLD 435 and MMG 463 RB: BLD 424 and BLD 430 R: Open to students in the Diagnostic Molecular Science major or in the Medical Technology major or in the Lyman Briggs Diagnostic Molecular Science Coordinate Major or in the Lyman Briggs Medical Technology Coordinate major.
Diagnostic assays across various disciplines within the clinical laboratory (microbiology, immunohema-tology, hematology and molecular diagnostics) as well as data interpretation and problem solving skills.

414 Clinical Chemistry Analysis and Practice
Spring. 3(3-0) P: (STT 200 or concurrently) or (STT 231 or concurrently) or (STT 351 or concurrently) or (STT 421 or concurrently) RB: BLD 213 and PHY 231 R: Open to students in the Medical Technology major or in the Lyman Briggs Medical Technology Coordinate Major. SA: MT 417 Not open to students with credit in BLD 417.
Concepts and principles of analytic methods commonly used in the clinical laboratory. Qualitative and quantitative features of instrumental analysis. Issues of quality control and quality assurance, method evaluation and standards of laboratory practice.

416 Clinical Chemistry
Fall. 4(4-0) P: BLD 213 and (BMB 401 or BMB 461) and (PSL 250 or PSL 432) RB: BLD 417 and (CEM 532 or CEM 533) SA: MT 416
Correlation of laboratory test results with normal physiology and biochemistry and with disease states. Metabolic and endocrine systems. Acquired and inherited diseases. Therapeutic drug monitoring, and toxicology.

417 Quality Processes in Diagnostic Laboratory Testing
Spring. 2(2-0) P: (STT 200 or concurrently) or (STT 231 or concurrently) or (STT 421 or concurrently) or (STT 351 or concurrently) or (STT 231 or concurrently) RB: BLD 213 and PHY 231 R: Open to students or students in the Clinical Laboratory Sciences major or in the Diagnostic Molecular Science major or in the Lyman Briggs Diagnostic Molecular Science Coordinate Major. SA: MT 414, MT 417 Not open to students with credit in BLD 414.
Statistical methods for validating diagnostic laboratory tests including quality control processes, proficiency testing, method evaluation, related regulatory requirements, laboratory information systems, and laboratory mathematics.

424 Advanced Hematology, Hemostasis and Urinalysis
Spring. 2(2-0) P: BLD 324 SA: MT 422, MT 424
Etiology and pathogenesis of diseases of the hematologic, hemostatic and urinary systems including anemias, leukemias, and hemophilies. Diagnostic testing for such diseases.

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

430 Molecular Laboratory Diagnostics
Spring. 2(2-0) P: BS 111 or LB 145 or BS 149H or BS 159H SA: MT 430
Concepts and principles of molecular analysis applied to medical diagnostics and related applications.

433 Clinical Immunology and Immunohematology Laboratory
Spring. 1(0-3) P: BLD 213 and (BLD 435 or concurrently) R: Open to students in the Clinical Laboratory Sciences major. SA: MT 433
Immunologic methods for disease detection. Methods of blood typing and pre-transfusion testing.

434 Clinical Immunology
Fall. 3(3-0) P: (BS 111 or concurrently) or (LB 145 or concurrently) or (BS 149H or concurrently) or (BS 159H or concurrently) RB: BLD 204 and BLD 213 SA: MT 432, MT 434 Not open to students with credit in MMG 451.
Concepts of innate, cellular, and humoral immunity. Immunodeficiency and autoimmunity. Principles and applications of immunassays in medical laboratories.

435 Transfusion and Transplantation Medicine
Spring. 3(3-0) P: BLD 434 or MMG 451 SA: MT 432, MT 435
Principles and practice of transfusion medicine including blood typing. Principles and practices of transplantation medicine. Transplantation immunology, organ procurement, and rejection detection.

436 Principles of Diagnostic Molecular Science
Spring. 2(2-0) P: BMB 461 and (BS 111 or LB 145 or BS 149H or BS 159H) and (BS 341 SA: MT 436 Not open to students with credit in BLD 430. C: BMB 462 concurrently.
Principles and techniques of molecular diagnostic assays including applicable regulations.

437 Clinical Applications of Diagnostic Molecular Science
Spring. 2(2-0) P: BLD 436 SA: MT 437 Not open to students with credit in BLD 832.
Application of molecular diagnostic methods in clinical and other types of laboratory disciplines.

438 Molecular Diagnostic Laboratory
Fall. 2(0-6) P: BLD 436 SA: MT 438 Not open to students with credit in BLD 832.
Laboratory in molecular techniques with emphasis on clinical and diagnostic applications.

442 Education and Management in the Clinical Laboratory
Spring. 3(3-0) P: MTH 116 or (MTH 103 and MTH 114) or (STT 200 or STT 201 or STT 351 or STT 421) R: Open to students in the Clinical Laboratory Sciences major or in the Diagnostic Molecular Science major. SA: MT 442
Basic principles and concepts in education and management in clinical laboratories. Systematic approach to instructional design, delivery and evaluation. Principles of leadership, personnel management, fiscal management, and regulatory compliance.
450 Eukaryotic Pathogens
Spring, 3(3-0) P: BS 111 or LB 145 or BS 149H or BS 159H RB: MMG 201 or MMG 301 SA: MT 450
Medically important fungi and parasites. Host-parasite relationships, life cycles, culture, identification, and associated diseases.

455 Integrating Clinical Laboratory Science Discipline (W)
Fall, Spring, 2(2-0) P: (BLD 324 or concurrently) or (BLD 417 or concurrently) or (BLD 416 or concurrently) or (MMG 463 or concurrently) or (BLD 435 or concurrently) or (CEM 332 or concurrently) or (BLD 436 or concurrently) and completion of Tier I writing requirement R: Open to undergraduate students in the Clinical Laboratory Sciences major and open to undergraduate students in the Diagnostic Molecular Science major and open to undergraduate students in the Medical Technology major. SA: MT 455
Problem oriented approach integrating topics from biomedical laboratory diagnostics courses with emphasis on writing experience in the major and on critical thinking skills.

463 Medical Microbiology
Fall, 3(3-0) interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. P: MMG 301 RB: MMG 451 or BLD 434 R: Open to juniors or seniors in the Biomedical Laboratory Diagnostics Program or in the Department of Microbiology and Molecular Genetics or in the Lyman Briggs Environmental/Biology/Microbiology Coordinate Major or in the Lyman Briggs Genomics and Molecular Genetics Coordinate Major or in the Lyman Briggs Human Biology Coordinate Major or in the Human Biology major or in the Lyman Briggs Medical Technology Coordinate Major or in the Lyman Briggs Microbiology Coordinate Major or in the Environmental Biology/Microbiology major or in the Genomics and Molecular Genetics major. SA: MIC 463
Properties of pathogenic bacteria and viruses and their mechanisms of pathogenicity and clinical diagnoses.

464 Diagnostic Microbiology Laboratory
Fall, 2(0-4) interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. P: MMG 463 or concurrently R: Open to juniors or seniors in the Department of Microbiology and Molecular Genetics or in the Biomedical Laboratory Diagnostics Program or in the Clinical Laboratory Sciences major. SA: MIC 464
Clinical laboratory diagnostic procedures for the identification of pathogenic microbes.

471 Advanced Clinical Chemistry Laboratory
Fall, Spring, Summer. 3 credits. P: CEM 333 R: Open to students in the Clinical Laboratory Sciences major. SA: MT 471
Application and integration of theory and technical skills in clinical chemistry and biochemistry.

472 Advanced Clinical Chemistry
Fall, Spring, Summer. 1 credit. P: BLD 416 and BLD 417 R: Open to seniors in the Clinical Laboratory Sciences major. SA: MT 472 C: BLD 471 concurrently
Theoretical aspects of clinical chemistry, chemical and biochemical reactions, statistical analysis, and pathophysiologic relationships. Integration of cognitive material with clinical laboratory test results.

473 Advanced Clinical Hematology and Body Fluids Laboratory
Fall, Spring, Summer. 3 credits. P: BLD 424L or concurrently R: Open to seniors in the Clinical Laboratory Sciences major. SA: MT 473
Application and integration of theory and technical skills in hematology, hemostasis, and body fluid analysis.

474 Advanced Clinical Hematology and Body Fluids
Fall, Spring, Summer. 1 credit. P: BLD 424 R: Open to seniors in the Clinical Laboratory Sciences major. SA: MT 474 C: BLD 473 concurrently.
Theoretical aspects of advanced hematology, hemostasis and body fluid analysis. Integration of cognitive material with clinical laboratory test results.

475 Advanced Clinical Immunology and Immuno-hematology Laboratory
Fall, Spring, Summer. 2 credits. P: BLD 433 R: Open to seniors in the Clinical Laboratory Sciences major. SA: MT 475
Application and integration of theory and technical skills in immunology and immunohematology.

476 Advanced Clinical Immunology and Immunohematology
Fall, Spring, Summer. 1 credit. P: BLD 433 and BLD 434 R: Open to seniors in the Clinical Laboratory Sciences major. SA: MT 476 C: BLD 475 concurrently.
Theoretical aspects of immunology and immunohematology. Integration of cognitive material with clinical laboratory test results.

477 Advanced Clinical Microbiology Laboratory
Fall, Spring, Summer. 3 credits. P: MMG 464 and BLD 450 R: Open to seniors in the Clinical Laboratory Sciences major. SA: MT 477
Application and integration of theory and technical skills in clinical microbiology and infectious disease.

478 Advanced Clinical Microbiology
Fall, Spring, Summer. 1 credit. P: MMG 463 or BLD 450 or BLD 498 R: Open to seniors in the Clinical Laboratory Sciences major. SA: MT 478 C: BLD 477 concurrently.
Theoretical aspects of clinical microbiology and infectious disease. Integration of cognitive material with clinical laboratory test results.

479 Professional Behavior in Clinical Laboratory Science
Fall, Spring, Summer. 1(0-2) P: (BLD 220 and BLD 442) and (BLD 471 or concurrently) or (BLD 473 or concurrently) or (BLD 475 or concurrently) or (BLD 477 or concurrently) R: Open to students in the Clinical Laboratory Sciences major. SA: MT 479
Application of professional behavior principles to practical experiences in clinical laboratory science.

482 Advanced Diagnostic Molecular Science Laboratory
Spring, 2 credits. R: Open to students in the Diagnostic Molecular Science major. SA: MT 482 C: BLD 483 concurrently or BLD 484 concurrently or BLD 486 concurrently or BLD 486 concurrently
Integration of principles and concepts in diagnostic molecular science with diagnostic laboratory test results.

483 Molecular Diagnostic Experience in Hematopathology and Oncology
Spring, 2 credits. P: BLD 438 R: Open to students in the Diagnostic Molecular Science major. SA: MT 483 C: BLD 482 concurrently.
Clinical experience in molecular diagnostic laboratories with applications in hematopathology and oncology.

484 Molecular Diagnostic Experience in Infectious Disease
Spring, 2 credits. P: BLD 438 R: Open to students in the Diagnostic Molecular Science major. SA: MT 484 C: BLD 437 concurrently.
Clinical experience in molecular diagnostic laboratories with applications to infectious disease diagnosis.

485 Molecular Diagnostic Experience in Inherited and Predictive Genetics
Spring, 2 credits. P: BLD 438 R: Open to students in the Diagnostic Molecular Science major. SA: MT 485 C: BLD 462 concurrently.
Clinical experience in molecular diagnostic laboratories with applications to inherited and predictive genetics.

486 Molecular Diagnostic Experience in Genotyping and Individual Identification
Spring, 2 credits. P: BLD 438 R: Open to students in the Diagnostic Molecular Science major. SA: MT 486 C: BLD 482 concurrently.
Clinical experience in molecular diagnostic laboratories with applications to genotyping and identification of individuals.

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 Clinical Laboratory Sciences major or in the Diagnostic Molecular Science major or in the Lyman Briggs School-Medical Technology Coordinator Major or in the Medical Technology major. SA: MT 495
Faculty directed study including assigned readings, reviews of appropriate scientific periodicals, research, and laboratory experience.

498 Focused Problems in Clinical Laboratory Science
Spring, 2(1-2) P: (MMG 463 or concurrently) and (MMG 464 or concurrently) R: Open to students in the Clinical Laboratory Sciences major. SA: MT 454, MT 498
Case study problems of medical microbiology, hematology, and clinical chemistry.

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.

811 Fundamentals of Scientific Research
Spring of even years. 1(1-0) R: Open to masters students in the Biomedical Laboratory Diagnostics Program. SA: MT 810 Not open to students with credit in NSC 830.
Best practices for the research enterprise. Ethical conduct of research. Critical evaluation of scientific literature.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>815</td>
<td>Cell Biology in Health and Disease I</td>
<td>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.</td>
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<tr>
<td>816</td>
<td>Cell Biology in Health and Disease II</td>
<td>Summer. 2(2-0) P: BLD 815 RB: Undergraduate course in biochemistry and physiology. Experience in a clinical laboratory Continuation of BLD 815.</td>
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<tr>
<td>820</td>
<td>Advanced Human Hematology</td>
<td>Fall of odd years. 2(2-0) Interdepartmental with Pathobiology and Diagnostic Investigation. Administered by Biomedical Laboratory Diagnostics. RB: BLD 424 Pathogenetic, mechanisms, and morphological pictures. Laboratory tests and interpretation of results.</td>
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<tr>
<td>821</td>
<td>Advanced Clinical Laboratory Practice</td>
<td>Spring. 1(1-0) P: PHM 830 or approval of department RB: Experience in a clinical laboratory Establishment and review of good clinical laboratory practice through the appropriate use of statistical functions.</td>
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<tr>
<td>830</td>
<td>Concepts in Molecular Biology</td>
<td>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.</td>
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<tr>
<td>831</td>
<td>Clinical Application of Molecular Biology</td>
<td>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.</td>
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<tr>
<td>832</td>
<td>Molecular Pathology Laboratory</td>
<td>Summer. 2(0-4) P: BLD 831 or concurrently SA: MT 831L, MT 832 Equipment operation, DNA extraction and measurement, electrophoresis, hybridization and transfers, amplification and detection including techniques and automated sequencing. Clinical applications.</td>
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<tr>
<td>835</td>
<td>Hemostasis, Thrombosis and Effective Resource Management</td>
<td>Fall. 3(3-0) RB: Background in hemostasis, thrombosis and blood product management. R: Open to lifelong graduate students in the College of Natural Science or in the Biomedical Laboratory Diagnostics Program or in the Clinical Laboratory Sciences major or approval of department. Theories of coagulation, thrombosis and effective blood product management. Needs and particular stresses during an active bleeding crisis.</td>
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<tr>
<td>836</td>
<td>Adverse Transfusion Outcomes: Detection, Monitoring and Prevention</td>
<td>Spring, Summer. 2(2-0) RB: Medical technology and clinical laboratory sciences laboratory professionals. R: Open to lifelong graduate students and open to graduate students in the Biomedical Laboratory Operations major or in the Clinical Laboratory Sciences major. Adverse transfusion outcomes (ATO) covering cause, methods of detection, monitoring paradigms and prevention.</td>
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<tr>
<td>842</td>
<td>Managing Biomedical Laboratory Operations</td>
<td>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.</td>
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<tr>
<td>844</td>
<td>Topics in Biomedical Laboratory Operations</td>
<td>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.</td>
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<td>846</td>
<td>Decision Processes for Biomedical Laboratory Operations</td>
<td>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.</td>
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<tr>
<td>850</td>
<td>Concepts in Immunodiagnostics</td>
<td>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.</td>
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<td>851</td>
<td>Clinical Application of Immunodiagnostic Principles</td>
<td>Spring, Summer. 2(2-0) P: BLD 850 SA: MT 851 Immunodiagnostic theories and principles applied to clinical assay development and method evaluation.</td>
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<td>852</td>
<td>Immunodiagnostics Laboratory</td>
<td>Summer, 2(2-0) P: BLD 850 SA: MT 851L, MT 852 Performance of immunopurifications, in vitro diagnostic assays and basic flow cytometry. Data analysis and quality control evaluation.</td>
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<td>860</td>
<td>Clinical Laboratory Diagnosis of Infectious Diseases</td>
<td>Fall of odd years. 2(2-0) Interdepartmental with Pathobiology and Diagnostic Investigation. Administered by Biomedical Laboratory Diagnostics. RB: MMG 451 and MMG 464 and BLD 434 SA: MT 860 Laboratory techniques for diagnosing infectious diseases in humans. Emphasis on differential diagnosis and correlation of microbiological results with serology, hematology, and clinical chemistry.</td>
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BLD—Biomedical Laboratory Diagnostics