

2012-2013 Undergraduate Academic Catalog Supplement/Addendum
DeVry University—Phoenix Campus
Clinical Laboratory Science Degree program
April, 2012

The following supplements the Program Descriptions section in the U.S. academic catalog at www.devry.edu/uscatalog.

For comprehensive consumer information, visit devry.edu/bcls

Clinical Laboratory Science

DeVry's Clinical Laboratory Science program is designed to prepare graduates for positions in hospital, medical, physician and commercial laboratories as clinical laboratory scientists in areas such as hematology/hemostasis, immunohematology, immunology, clinical chemistry and microbiology (including molecular diagnostics). Through analysis of body fluids and cells, clinical laboratory scientists play crucial roles in detecting, diagnosing and treating disease and providing test results to other healthcare professionals. DeVry's CLS program uses a combination of didactic and clinical education to help students develop a wide range of professional skills needed to function in an atmosphere of inquiry and innovation.

Program Objectives

The Clinical Laboratory Science program is designed to produce graduates who are able to:

- Exhibit independent judgment in applying principles of preanalytical, analytical and postanalytical concepts in all areas of the clinical lab - hematology, clinical chemistry, immunohematology, microbiology, immunology, hemostasis, body fluids, phlebotomy, and molecular diagnostics.
- Identify and correct, when appropriate, sources of biohazards and unsafe lab practices in compliance with federal, state and local regulations.
- Demonstrate proficiency in operating, maintaining, troubleshooting, managing and evaluating a variety of laboratory equipment.
- Evaluate published studies through understanding and application of research design and practice as they relate to clinical laboratory science.
- Demonstrate understanding and applications of human resource and financial management, regulatory compliance, budgeting, and quality assurance and improvement to ensure timely, accurate and cost-effective reporting and appropriate use of lab-generated information.

DeVry accomplishes these goals by:

- Providing an academic program with a solid foundation in the arts and sciences, with strong emphasis on the natural sciences, including the more specialized areas of microbiology, cell biology, immunology, organic chemistry and biochemistry.
- Incorporating into each science and clinical science course a strong lab or clinical component, including use of appropriate hardware and software for testing and analyzing biological samples.
- Integrating general competencies such as applied research, written and oral communication, critical thinking, problem-solving and team skills into science and non-science courses.

Program details

Degree: Bachelor of Science in Clinical Laboratory Science

Semesters: 9 full time

Minimum credit hours required for graduation: 130

The Clinical Laboratory Science program at DeVry's Phoenix campus is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), 5600 N. River Rd., Suite 720, Rosemont, IL 60018, 773.714.8880, www.naacls.org.

Program Outline

Each lettered group in the following outline represents a graduation requirement. Though some courses may appear in more than one course area, each course may be applied to fulfill one graduation requirement only.

Course Area	Minimum Credit Hours
Communication Skills	15
(a) all of: ENGL112; ENGL135	
(b) one of: ENGL216; ENGL219; ENGL227	
(c) one of: ENGL230; SPCH275; SPCH277; SPCH279	
Humanities	9

(a) one of: HUMN303; LTRE421; LTRE422; LTRE424; LTRE427; LTRE428; HUMN450	
(b) all of: LAS432; ETHC445	
Social Sciences	9
(a) one of: PSYC110; SOCS185; SOCS187; SOCS190	
(b) one of: PSYC285; PSYC305; PSYC315; SOCS315; SOCS325; SOCS335; SOCS350; SOCS410	
(c) one of: ECON312; LAWS310; LAWS420; POLI330; POLI410	
Personal and Professional Development	5
(a) all of: CARD405; COLL148	
Mathematics and Natural Sciences	47
(a) all of: MATH114; MATH221	
(b) all of: BIOS140; BIOS195; BIOS242; BIOS245; BIOS380; BIOS390; BIOS480; CHEM130; CHEM140; CHEM225	
Clinical Laboratory Science	46
(a) all of: CLS100; CLS210; CLS225; CLS230; CLS240; CLS299; CLS350; CLS351; CLS399; CLS408; CLS410; CLS420; CLS430; CLS440; CLS450; CLS451; CLS499	

The following amends the Course Descriptions section in the U.S. academic catalog at www.devry.edu/uscatalog :

BIOS242 Fundamentals of Microbiology with Lab

This course covers basic concepts of microbiology, with emphasis on medically important microorganisms and infectious diseases. Also addressed are microscopy, microbial growth and genetics, antimicrobial agents, epidemiology, and immune system responses to pathogens. Lab exercises focus on aseptic techniques; isolation and culture of microorganisms; microscopy; and staining techniques. Prerequisite: BIOS140 / 5-4

BIOS245 Cell Biology with Lab

This introductory course focuses on structural organization and processes of eukaryotic cells. Topics include fundamental molecular, cellular and genetic processes common to all mammalian cells. In the lab, students employ methodologies and techniques commonly used in modern cell biology, with an emphasis on clinical relevance. Prerequisites: BIOS140 and CHEM130 / 5-4

BIOS380 Introduction to Biochemistry with Lab

This course examines theory and application of biochemical principles. Topics include basic structures of the major classes of biological molecules, including carbohydrates, lipids, proteins and nucleic acids, as well as exploration of central metabolic activities of living organisms. Lab exercises relate to topics discussed. Prerequisite: CHEM-225 / 5-4

BIOS390 Molecular Biology with Lab

This course focuses on the molecular mechanisms of cellular processes. Topics covered include DNA replication, genetic recombination, transcription, gene regulation, protein synthesis, genomics and proteomics. Molecular methods used to analyze these processes are also covered. Lab exercises relate to topics discussed. Prerequisites: BIOS242 and BIOS380 / 5-4

BIOS480 Immunology

This course examines concepts of immunology as related to antigen presentation, immunoglobulin structure, host defense mechanisms, allergies and autoimmunity, with particular emphasis on use of the antigen-antibody reaction in pathogen detection. Prerequisites: BIOS242, BIOS245 and BIOS380 / 3-3

CHEM130 General Chemistry I with Lab

This course covers fundamental principles and laws involved in chemical change. Topics include measurement nomenclature, stoichiometry, atomic structure, bonding, properties of gases, liquids and solids, and solution calculations. Lab exercises relate to topics discussed. Prerequisite: MATH114 / 5-4

CHEM140 General Chemistry II with Lab

Students in this course continue their study of fundamental principles and laws involved in chemical change. Topics include acids and bases, bonding theory, electrochemistry, equilibrium, thermodynamics, kinetics and nuclear chemistry. Lab exercises relate to topics discussed. Prerequisite: CHEM130 / 5-4

CHEM225 Fundamentals of Organic Chemistry with Lab

This course presents fundamentals of organic chemistry, with emphasis on structure, nomenclature and reactions as applied to organic compounds. Topics discussed include compound nomenclature, stereochemistry, alkanes, alkenes, alkynes, haloalkanes, alcohols, ethers, epoxides, carbonyl containing compounds, aromatics and spectroscopy. Biochemical molecules are introduced, with their organic functional groups. Laboratory exercises relate to and support the topics discussed. Prerequisite: CHEM140 / 5-4

CLS100 Laboratory Science Career Entry Exploration and Phlebotomy

Students explore career opportunities associated with professions in clinical laboratory science, which seeks to understand changes in function and structure of organs, tissues, cells and their body fluids that lead to disease and death. The role of the clinical laboratory scientist and interaction with other members of the healthcare team are discussed. Special emphasis is placed on the practice of phlebotomy (obtaining blood specimens) and securing specimens for testing. Students perform phlebotomy on classmates during lab exercises. Prerequisite: Admission to the Clinical Laboratory Science program / 2-2

CLS210 Clinical Chemistry I with Lab

This clinical course describes principles and procedures for performing clinical lab tests for carbohydrates, lipids, proteins, heme derivatives, enzymes, liver function, urinalysis, spinal fluid, electrolytes, acid-base blood gases, therapeutic drug monitoring, toxicology, endocrine systems and trace elements. Application of statistical analysis to principles of quality assurance and quality control are incorporated into routine practice. Lab exercises support topics discussed. Prerequisite: BIOS380 / 5-4

CLS225 Clinical Microbiology I with Lab

This clinical course applies basic scientific diagnostic principles and lab examination to clinically significant bacteria. Students identify medically relevant aerobic gram-positive and -negative cocci, and gram-positive and -negative bacilli, through morphological and biochemical characteristics. Mycobacterium, Chlamydia, Mycoplasma and other viruses are discussed, as are blood and tissue protozoa, intestinal and urogenital protozoa, and intestinal and tissue helminthes. Laboratory exercises support the topics discussed. Prerequisite: BIOS242 / 5-4

CLS230 Hematology and Hemostasis I with Lab

This clinical course examines morphology and function; production and destruction; metabolism; and related disease states associated with hematopoiesis including erythropoiesis, leukopoiesis and platelets. Lab procedures include examining cell morphology and enumeration, and quantification of coagulation parameters. Students evaluate, interpret and report test results, including criteria by which specimens should be referred for further review. Microscopy is studied, including basic principles, components, functions, adjustments, focus features and maintenance. Laboratory exercises support the above topics. Prerequisites: BIOS195 and BIOS242 / 5-4

CLS240 Immunohematology I with Lab

This clinical course addresses how blood group genetics, characteristics of blood group systems and related principles of immunohematology influence blood bank practices and transfusion services. Donor criteria, as well as collecting and processing blood and other tissues, are examined. Prerequisites: CLS230 and CLS408/ 4-3

CLS299 Introduction to Professional Practice for the Clinical Laboratory

Students in this course assess professional and personal goals as they prepare for training rotations in clinical laboratory settings. Students perform an individualized health assessment in terms of reviewing their vaccinations and accepting personal responsibility in adhering to safe practices; applying rules and regulations of health information; incorporating behavior principles of safety and infection control; and model the role of the clinical laboratory scientist. The course must be taken one session immediately prior to CLS-350. Prerequisites: Permission from the program director, and all other requirements stated in *Additional Academic and Administrative Requirements for Clinical Laboratory Science Program Students* / 1-1

CLS350 Clinical Practicum I

In this course students engage in a full-time practicum at an affiliated healthcare site under the supervision of clinical laboratory professionals. Approximately 320 hours of practical experience is gained, covering all areas of the routine clinical laboratory. The course is graded on a Satisfactory / Unsatisfactory basis. Prerequisites: Permission from the program director, and all other requirements stated in *Additional Academic and Administrative Requirements for Clinical Laboratory Science Program Students* / 4-4

CLS351 Clinical Practicum II

This course, a continuation of CLS-350, completes the first full-time practicum sequence. Meeting at an affiliated healthcare site under the supervision of clinical laboratory professionals, the course comprises approximately 280 hours of practical experience in all areas of the routine clinical laboratory. The course is graded on a Satisfactory / Unsatisfactory basis. Prerequisites: CLS-350 and good academic standing / 3-3

CLS399 Clinical Laboratory Operations and Management

This course examines principles of lab management, including fiscal and regulatory aspects. Quality control and assessment as tools for excellence in lab services are examined. Use of lab information systems as management resources, and for business and strategic planning, is introduced. Human resource management is discussed in the context of professional practice. Prerequisites: two CLS courses numbered 200 or above / 2-2

CLS408 Clinical Immunology with Lab

This course examines immunochemistry and immunobiology, which play an evolving role in diagnosing health and disease. Immunocytology through the hematopoietic and lymphoid systems is discussed. Clinical lab techniques using immunological principles such as precipitation, agglutination and hemagglutination are addressed. Concepts of phagocytosis, allergy, hypersensitivity, autoimmune disease,

transplantation, tumor immunology, and natural resistance and acquired immunity are explained in terms of patient symptoms and lab tests. Laboratory exercises support the topics discussed above. Prerequisite: BIOS480 / 4-3

CLS410 Clinical Chemistry II

In this course, molecular and genetic basis of inherited metabolic disorders, immunologic disorders, tumor markers and other chemistry-related tests are discussed in the context of health and disease. Techniques for identifying and resolving variations and discrepancies in test results and procedures are discussed. Students learn how to design and perform method evaluation studies; focus on quality assurance and management; gain experience in evaluating lab data; assess tests for validity and accuracy; and document corrective action. They also become familiar with a variety of lab instruments. Prerequisite: CLS350 / 2-2

CLS420 Clinical Microbiology II

Clinical Microbiology II complements Clinical Microbiology I with discussions on selected topics, including algorithms, case studies and systems diagnoses. A main focus is on a systems-based microbial disease diagnosis: respiratory, gastrointestinal, integumentary, cardiovascular and genitourinary systems. Students discuss how to evaluate new protocols and procedures; interpret complex concepts and explain them to other members of the healthcare team; and resolve discrepancies. Prerequisite: CLS350 / 2-2

CLS430 Hematology and Hemostasis II

This course examines hematopathology with classification of anemias, hemoglobinopathies, hemoglobin defects, leukocyte disorders, cytochemistry, histochemistry, cytogenetics, classification of leukemias, myeloproliferative and lymphoproliferative disorders, myelodysplastic syndromes and leukocyte neoplasia. Hemostasis examines pathophysiology including vascular purpuras, platelet disorders, hemophilia and thrombotic disorders. Prerequisite: CLS350 / 2-2

CLS440 Immunoematology II

This course explores advanced concepts in genetics and immunology as applied to immunoematology. Indications for transfusions, component therapy, and adverse effects of transfusions are discussed. Federal and state regulations and current standards of practice are examined, as is accreditation in blood and other tissue banking. Prerequisite: CLS350 / 2-2

CLS450 Clinical Practicum III

This course is a full-time practicum comprising approximately 240 hours at an affiliated healthcare site under the supervision of clinical laboratory professionals. Practical experience and further acquisition of theoretical principles in all areas of the clinical laboratory are included, with emphasis on special testing, problem solving and a variety of supervisory functions. Review for the national certification exam is included. Prerequisites: CLS351, CLS410, CLS420, CLS430, CLS440, and good academic standing / 3-3

CLS451 Clinical Practicum IV

This course, a continuation of CLS450, completes the final practicum sequence. Meeting at an affiliated healthcare site under the supervision of clinical laboratory scientists, the course includes practical experience and further acquisition of theoretical principles in all areas of the clinical laboratory, with emphasis on special testing, problem solving and a variety of supervisory functions. Review for the national certification exam is included. Prerequisites: CLS450 and good academic standing / 3-3

CLS499 Professional Education and Research

This course explores methods and teaching techniques to prepare clinical lab scientists to educate healthcare professionals, patients and the public. The role and impact of program assessment, planning, delivery and evaluation on continuing education and professional development of staff are discussed. Prerequisites: two CLS courses numbered 200 or above / 2-2

The following supplements the Admission Information section in the U.S. academic catalog at www.devry.edu/uscatalog:

Students are expected to have the functional abilities listed below in order to succeed in the clinical coursework required in the Clinical Laboratory Science program.

Functional Abilities	Standard	Examples (not meant to be inclusive)
Physical Stamina	Exhibit physical strength and endurance appropriate to healthcare professionals throughout assigned shifts	Lift or move patients, support patients walking, work complete shifts, conduct CPR
Hearing	Hear, with or without aids, voices, sounds and monitoring alarms necessary for safe practice	Hear patients speaking, respond to equipment alarms
Sight	Distinguish color and visual images within normal range	Determine color changes during physical assessment and laboratory procedures, read computer/monitoring screens during use of a variety of healthcare equipment such as microscopes, laboratory analyzers, etc.

Olfactory Sensation	Detect odors, unusual smells or smoke	Assess odors during physical assessment, and detect odor of smoke or other fumes
Tactile Sensation	Interpret sensations, temperature and environmental temperature	Perform palpation for monitoring or procedures, respond to environmental temperature changes, sense device movement
Physical Health Status	Maintain physical health consistent with employment responsibilities and commitments	Monitor own health
Mental Health Status	Maintain focus and emotional stability in stressful situations, and respond to needs of others	Manage own emotions, respond appropriately in crisis situations, adapt to change readily and maintain therapeutic boundaries
Gross Motor Skills	Exhibit ability to move, sit, stand and walk safely	Bend, stoop or reach for objects, and maintain balance
Fine Motor Skills	Demonstrate ability to write, grasp, pick up or manipulate small objects	Write legibly, manipulate syringes, calibrate equipment and use micropipettes
Mobility	Demonstrate physical abilities consistent with role	Move quickly from place to place, and move freely in patient care areas or within a laboratory

The following supplements the Academic Information section in the U.S. academic catalog at www.devry.edu/uscatalog:

Additional Academic and Administrative Requirements for Clinical Laboratory Science Program Students

Course Prerequisites

For a course listing a CLS course as prerequisite, a grade of C or above in the prerequisite CLS course is required to enroll in the subsequent course.

Additional Requirements for Enrolling in CLS-299, Introduction to Professional Practice for the Clinical Laboratory

CLS students must meet the following requirements in order to enroll in CLS299.

- Be in good academic standing
- Have passed or be concurrently enrolled in all required courses with prefixes BIOS or CHEM, as well as CLS100, CLS210, CLS225, CLS230, CLS240 and CLS408. Note that concurrent enrollment requires instructor's approval.

Additional Requirements for Successfully Completing CLS299, Introduction to Professional Practice for the Clinical Laboratory

CLS students must meet the following requirements in order to complete CLS299 successfully.

- Provide documentation of the following personal health statuses. Documentation must be received from the student's healthcare provider.
 - Standard history and physical examination performed by the student's family or school physician within one year prior to the start date of CLS299.
 - A PPD intermediate skin test within one year prior to the start date of CLS299, except for students who received the BCG vaccine.
 - Chest X-ray for students whose PPD test results are positive or whose examining physician requests the X-ray.
 - Records of completed courses of immunization that include Rubella. (Rubella titer is accepted in lieu of Rubella immunization.)
 - Evidence of Varicella immune status by titer.
 - Proof of acceptable vaccination for, or lab evidence of immunity to, measles (students born after 1956).
 - Evidence of Hepatitis B vaccination. Students not wishing to receive the Hepatitis B vaccine series must sign a declination and submit it to their academic advisor. Declinations become part of students' health records.
 - Declaration of the student's general ability to function in a clinical setting.
- Undergo a criminal background check at the students' expense. Students whose results prevent them from participating in clinical activities cannot finish their program's required coursework and therefore cannot graduate.
- Be tested for illegal substance use at the students' expense. Students whose test results are positive cannot finish the program's required coursework and therefore cannot graduate. Random drug screening may be required.

If the student does not remain continuously enrolled after meeting the above requirements, updated documentation may be required.

Requirements for Enrolling in a Practicum Course

To enroll and participate in a practicum course, students must:

- Be in good academic standing
- Earn a grade of C or above in CLS299

- Receive permission from the CLS program's clinical coordinator and program director. In determining students' readiness for additional clinical coursework, the director will assess candidates' technical competency, emotional stability and maturity, interpersonal and communication skills, and ability to relate effectively to other healthcare professionals.
- Purchase, for that practicum, a uniform as required by the practicum's clinical affiliate, to be worn during clinical rotations at that affiliate.
- Acquire a Clinical Handbook from the clinical coordinator. The handbook was developed specifically for the clinical portion of DeVry's Clinical Laboratory Science program. It outlines in detail course requirements, grading requirements and other information.

Individual healthcare facilities may have additional requirements. CLS students will be informed of these requirements.

The following supplements the Graduation Requirements section in the U.S. academic catalog at www.devry.edu/uscatalog:

Additional Graduation Requirement for Clinical Laboratory Science Program Students

To graduate, students in the Clinical Laboratory Science program must fulfill the following graduation requirement in addition to fulfilling general graduation requirements:

- Earn a grade of C or above in each CLS course after no more than two attempts of the course.

Students who attempt the same CLS course twice without earning a grade of C or above are dismissed from the program. Students must follow the Academic Appeal process in the U.S. academic catalog if they wish to be reinstated in the program.

The following supplements the Tuition and Expenses section in the U.S. academic catalog at www.devry.edu/uscatalog:

Clinical Documentation Requirements (Clinical Laboratory Science students only): Fees not to exceed a total of \$200 are associated with documentation required prior to entering the clinical portion of DeVry's CLS program, including a criminal background check, fingerprint card and drug screen.

Expenses: Transportation to off-campus clinical facilities, meals at off-campus clinical facilities, healthcare insurance and personal expenses are not included in the calculation of annual student costs. These expenses will vary according to individual student needs. DeVry will attempt to place students in a clinical assignment within a 50 mile radius of the location at which a student attends.

Tuition, Fees and Expenses Effective Beginning July 1, 2012

Program	Total Credit Hours	Tuition Per Credit: Hours 1-6	Tuition Per Credit: Hours 7 and Above	Total Cost	Group Accident & Sickness Insurance Charge¹	Student Services Charge²	Textbook & Equipment Expense³	Total Program Cost⁴
Clinical Laboratory Science (Baccalaureate Degree)	130	\$609	\$365	\$74,532	\$780	\$360	\$6,030	\$81,742.00

¹ insurance required for full-time onsite students (except in Minnesota) unless waiver received annually by November 1; annual charge is \$260

² charged at \$20 per session

³ average estimated per-session expense for full-time students

⁴ at current tuition rates, credit hours shown and full-time attendance; includes \$40 application fee, insurance (onsite students only) and student services charges, and average estimated per-session textbook and equipment expense