CLINICAL SCIENCE

College of Health, Human Services, and Nursing
Department of Clinical Science

Program Description

Undergraduate

The rapid expansion of basic medical information, methodology, and technology in recent years has increased the demand for highly trained professionals in clinical, research, and teaching laboratories. The training of such specialists as medical technologists (Medical/ Clinical Laboratory Scientists), and Cytotechnologists is all within the broad scope of the field of clinical science.

The Bachelor of Science Degree in Clinical Science is designed to provide baccalaureate-level preparation in the clinical science professions. A strong preclinical curriculum is combined with the science and liberal arts focus of the University. The curriculum at CSUDH is designed to be inclusive of courses required by both the California Department of Public Health for the CLS generalist license and ASCP certification in medical laboratory science.

CSUDH BS graduates are eligible to apply to the Post Baccalaureate Certificate for the clinical internship program in either Medical Technology or Cytotechnology. Please note that placement in a clinical site is competitive and not guaranteed.

Post-Baccalaureate Certificates

The Post Baccalaureate Certificate Program options in Cytotechnology and Medical Technology (Medical/Clinical Laboratory Scientists) provide an academic and clinical route to professional certification and California State licensure. All applicants must apply to the University through Cal State Apply and be admitted to the Post Baccalaureate Certificate in Clinical Science. Refer to the Graduate/Postbaccalaureate Admission Requirements in the University Catalog for details.

For post-baccalaureate students without a BS degree in either Clinical Science or Cytotechnology from CSUDH, additional coursework at CSUDH is required prior to becoming eligible to apply to the clinical internship program.

Graduates of the program, upon completion of their clinical training and passage of the appropriate certification examination(s), are considered to be clinical laboratory scientists and professionals armed with the technical skills and knowledge theory necessary to meet current and future standards of quality laboratory and health care services practice. The clinical or internship components of both options are offered under the supervision of university faculty, in affiliation with approved, accredited diagnostic healthcare facilities. Students admitted to the certificate program and who are planning to apply to a clinical option internship must meet the entry and prerequisite requirements specified in the Supplemental Criteria and Clinical Science Curriculum.

Pre-Admission Disclosure for Academic Program Leading to Licensure or Credentialing

Admission into programs leading to licensure and credentialing **does not guarantee** that students will obtain a license or credential. Licensure and credentialing requirements are set by agencies that are not controlled by or affiliated with the CSU and requirements can change at any time. For example, licensure or credentialing requirements can include evidence of the right to work in the United States (e.g., social security number or taxpayer identification number) or successfully passing a criminal background check. Students are responsible for determining whether they can meet licensure or credentialing requirements. The CSU will not refund tuition, fees, or any associated costs, to students who determine subsequent to admission that they cannot meet licensure or credentialing requirements. Information concerning licensure and credentialing requirements is available from the Program Director. Please contact the department.

Features and Accreditation

The Medical Technology program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) located at:

5600 N. River Rd., Suite 720
Rosemont, IL 60018
Phone: (773) 714-8880

The Cytotechnology clinical program is accredited through The Greater Los Angeles Consortium by the Program Review Committee of the American Society of Cytopathology, sponsored by the Commission on Accreditation of Allied Health Programs (CAAHEP) located at:

9355 113th St. N, #7709
Seminole, FL 33775
727-210-2350

Graduates of each program are eligible for the certification examination of the American Society of Clinical Pathology (ASCP) Board of Certification (BOC) and for licensure by the California State Department of Health.

Academic Advisement

Careful and comprehensive advising is a key to student success in the University and entails student, faculty, and University support services. Clinical Science majors are required to consult with an advisor upon admission and each semester before registration. Students must provide the program with copies of transcripts from all institutions attended. Each student should review the University Catalog and become familiar with the academic program and relevant policies and procedures before his/her first advising session. Students in their clinical year meet regularly with an assigned university education coordinator or liaison. Students in the clinical year meet periodically with the Program Director to monitor progress.

Preparation

High school students are encouraged to take chemistry, biology, and physics in addition to English, a foreign language, fine arts, and computer science courses.

College transfer students should contact their counseling office at their college before admission to CSUDH and contact the College of Health, Human Services, and Nursing Student Success Center after admission to the university to identify appropriate lower division major/minor preparatory courses. Courses in quantitative chemistry, anatomy and physiology, physics, general biology, and statistics are recommended.

Students with foreign degrees must have their transcripts evaluated by an approved external foreign transcript evaluation service and comply

with the University's policy on the Test of English as a Foreign Language (TOEFL).

The evaluation must document an acceptable baccalaureate degree before consideration for clinical placement may be made. The California State Department of Public Health Laboratory Field Services will accept the evaluation from “Current Members” of the National Association of Credential Evaluation Services (NACES) or “Endorsed Members” of the Association of International Credential Evaluators, Inc. (AICE)

Graduation With Honors

An undergraduate student may be a candidate for graduation with Honors in Clinical Science provided he or she meets the following criteria:

1. A minimum of 36 units in residence at CSU Dominguez Hills;
2. A minimum grade point average of 3.5 in courses used to satisfy the upper-division requirement in the major; and

Students who achieve Honors in Clinical Science will have the information recorded on their transcripts and diplomas.

Practicing Professionals in the Clinical Options

Cytotechnologists are skilled in examining human cellular material in search of abnormalities that are the warning signs of cancer. They perform a variety of diagnostic and research procedures in the cytology laboratory including basic cytologic examinations, staining, and processing of tissue specimens that have been removed by non-invasive techniques, surgery, or fine needle aspiration. Advanced techniques include the use of digital and immunofluorescent microscopy, cytogenetics, and molecular markers. The cytotechnologist is capable of developing a differential diagnosis based on cellular evidence in conjunction with pertinent cognitive knowledge and other clinical data.

The Medical Technologist is also known as a Clinical Laboratory Scientist (CLS) and/or Medical Laboratory Scientist (MLS), depending on the certification obtained. Medical Technologists perform or supervise the performance of clinical laboratory testing in the general and specialized areas of clinical biochemistry, hematology, medical microbiology, immunohematology, immunology, serology, and clinical microscopy. Data collected is correlated to pathophysiology and used by health professionals in the diagnosis, treatment, and prevention of disease. Medical Technologists may also review and conduct research activities.

Student Organizations

All Clinical Science Majors and other interested students are encouraged to join and become active in the Clinical Science Club (CSC). For application and other information, contact the club president or advisor to become a member.

Supplemental Admission Criteria and Policies for Clinical Internships

All applicants must first be admitted to the University. However, Admission to the University does not constitute automatic admission to the clinical internship. There is no direct admission into the Clinical Internship program. The clinical internship application is available in the Department. Contact the department based on the following timelines.

Application Dates for Clinical Internships

Clinical Application	Clinical Component	Dates Beginning
Cytotechnology	February 1-28	Summer Class
Medical Technology	October 1-31	Summer Class

For all postbaccalaureate clinical training internships, i.e., Cytotechnology and Medical Technology, **Supplemental Admission Criteria** apply.

Because clinical facilities in each of the options have a limited number of positions, a limited number of students are admitted to a given option. In addition, clinical positions may not be available to international student visa holders or students not proficient in English. For any clinical class, there may be more qualified applicants than can be accommodated, thereby designating the program as "impacted."

Applicants for clinical placement must have been fully admitted to the University and must have been in residence for two semesters prior to the beginning of the clinical component. BS degree applicants must have completed all graduation requirements with the exception of the preclinical requirement. However, all pre-clinical requirements must be scheduled for completion prior to the start of the clinical internship.

From among the applicants for a Clinical Option, the Committee for Clinical Laboratory Experience (CCLE) will determine those applicants who are accepted to the clinical internship on the basis of the following Supplemental Admission Criteria:

1. Grade point average in required "pre-clinical course work" (minimum 3.00 on a 4.00 scale). The pre-clinical courses must be completed at CSUDH unless department approval is received.
2. Completion of the pre-clinical course requirements. A minimum grade of “C” is required for all pre-clinical courses.
3. Desirable "pattern" of academic performance (i.e., consistency and/or improvement).
4. Evaluation by the Committee for Clinical Laboratory Experience (CCLE) of the student's potential to succeed in the program and the profession (appearance, attitude, interest, enthusiasm, poise, motivation, expectations, career planning, maturity, social understanding and involvement, flexibility, and stability).
5. Completion of a minimum of two semesters in residence at CSUDH to complete the preclinical course requirements prior to beginning the clinical training. Evaluation of missing coursework at the time of application will be performed on a case-by-case basis by the Program Director.
6. Physical, professional, and emotional fitness for the demands of the job as verified by a physician and three letters of recommendation. At least one of these letters should validate relevant work experience and/or knowledge of the field. Accordingly, it is recommended that one be from an employer and the others from faculty teaching for the pre-clinical course work at CSUDH or other institutions. Recommendations should address recent activities.
7. Clarity of expression (oral and written) and relevant extracurricular activity (e.g., active member or officer of a social club, Clinical Science Club, Science Society, etc.).
8. Have no felony convictions.
9. Other factors that will be considered, but which will not guarantee selection are prior qualified application, previous experience in a clinical laboratory setting, and veteran status.

Applicants to the clinical Internship who have repeated pre-clinical courses may have their ranking reduced in the selection process.

Repeating a single course more than once is discouraged. After 3 unsuccessful attempts, the applicant is no longer eligible for the Clinical Internship.

The CCLE is composed of university faculty and adjunct faculty from each clinical facility. One or more oral interviews will be required on campus and/or at the clinical facilities.

The program director will notify the applicant of the admission decision in consultation with the Committee for Clinical Laboratory Experience (CCLE). The program director, in consultation with the officials of the affiliated program, determines to which affiliate the student will be placed. Student preference is considered as one factor in the decision. In order to retain admission status, students must communicate their intention to the program director, in writing, within 15 working days following notification of admission. Final placement assumes continued eligibility under supplementary and basic admission criteria. In some cases, the CCLE may require additional coursework or performance levels prior to placement consideration. Failure to satisfy such requirements may disqualify the student from entering the clinical component.

Academic Regulations

For pre-clinical courses, a grade of "C" is the minimum acceptable grade. In the clinical component, a grade of "C" is the minimal acceptable grade. Students in the clinical internship who receive a grade or grades below the acceptable minimum or who show a lack of reasonable progress may be requested to appear before the Committee for Clinical Laboratory Experience and/or placed on academic notice. The committee also considers disciplinary cases. Continued lack of progress, in the opinion of the committee, and with the approval of the department Chairperson, may result in Administrative or Academic Dismissal from the clinical program.

Transportation

Students are required to furnish their own transportation to and from the clinical facility and in those pre-clinical courses that require field trips.

Uniforms

Laboratory coats are required in the clinical and for most pre-clinical courses.

Essential Functions

A combination of psychomotor and sensory abilities is needed by students to successfully achieve professional entry-level competencies in the clinical sciences. These "Essential Functions" fall into the categories of visual, motor, communications, behavior, and computational:

Essential Functions: Visual

The CLS student must possess sufficient visual acuity to recognize, perform, and analyze findings from clinical procedures, including the necessary skills to:

- Observe clinical demonstrations.
- Differentiate color reactions.
- Characterize physical properties of biologicals and solutions.
- Distinguish numbers, characters, decimal points, and graphs on an electronic screen.
- Distinguish numbers, characters, decimal points, and graphs on a hard copy report.
- Identify stained and unstained structural features of specimens using a binocular bright-field microscope.
- Match figures, lines, structural and spatial configurations with or apart from each other.
- Read calibration marks on measuring devices.
- Observe signs of distress from clients during phlebotomy, injections, or imaging.

Essential Functions: Motor

The CLS students must possess sufficient motor ability to perform clinical diagnostic tests and to manipulate laboratory equipment, including the necessary skills to:

- Travel to numerous clinical sites for assigned clinical rotations.
- Position patients for diagnostic procedures.
- Deliver assistance to clients in distress during phlebotomy.
- Control and adjust switches, dials, keypads, and/or touchpads on equipment used for laboratory tests and diagnostic procedure.
- Manipulate equipment used for phlebotomy, injections or fine needle biopsies.
- Control and adjust devices used for measuring biologicals, chemicals, or radiation.
- Move about a clinical facility in a safe manner.

Essential Functions: Communications

- Read, write, and verbalize in English.
- Read and comprehend technical policy and procedure manuals and test inserts.
- Follow verbal and written instructions.
- Instruct clients prior to specimen collection, in preparation for and/or during diagnostic procedures.
- Take written, computer, and practical examinations.
- Investigate and prepare a research paper and/or project.

Essential Functions: Behavior

The CLS student must possess sufficient behavioral skills to:

- Adapt to changes in schedule and/or assignments.
- Show flexibility and adjust to instruction from multiple clinical practitioners and Adjunct Faculty.
- Comply with the health, safety, and liability policies listed in the University Catalog.

Essential Function: Computational

The CLS student must possess sufficient computational skills to perform mathematical calculations needed for laboratory data analysis and quality assurance.

Health Insurance

Student health and accident insurance is required during clinical training. It is the responsibility of the student to secure acceptable insurance and present evidence of health insurance before entering the clinical. For additional information, contact the Student Health Center or the affiliate.

Liability Insurance

Clinical affiliates require students to carry professional liability insurance during the clinical component. In those cases, it is the responsibility of the student to provide evidence of such coverage prior to entering the

clinical class. An information packet on insurance requirements is included in the Application Packet for Clinical Placement.

Health Requirements

Immune Status

Students selected for internships in the clinical options will be required to demonstrate immunity to measles, mumps, rubella(MMR), and varicella. Students must also show that they are free from tuberculosis by PPD (TB Mantoux Skin Test), Quantiferon Gold TB test, or chest X-ray, and must present proof of immunity to hepatitis B, diphtheria, tetanus, pertussis, and COVID-19. The seasonal influenza vaccine and additional requirements may be required by specific sites. Students must provide documentation of all the above to the Clinical Science Program Director before beginning training at any affiliated facility.

Hepatitis B Vaccination

Clinical Science students will be offered, at their own expense, vaccination against Hepatitis B at the CSU Dominguez Hills Student Health Center. Students may refuse the vaccine using the approved waiver form. The record of waiver or vaccination must be provided to the clinical facility and on file in the Clinical Sciences department. Students may be vaccinated by their own healthcare provider or by the Department of Public Health. All students are encouraged to consult with their healthcare provider for information on possible adverse effects before being vaccinated.

Physical Examination

Successful applicants will be required to obtain a physical examination including a tuberculin skin test. Additional information on these procedures may be obtained by contacting the program office. The physical examination may be done by the student's family physician or, for a nominal fee, at the Student Health Center. An appointment is advised well in advance of the beginning of the clinical class.

Trainee License

For the clinical year in medical technology, students must obtain a California Clinical Laboratory Technologist Trainee's license before entering the clinical year. The Trainee license is requested online through the LFS website and official transcripts, with the degree, posted, are sent by the registrar's office, directly to:

State of California Department of Health Services Laboratory Field Services Section -PLS Program
850 Marina Bay Parkway, Building P, 1st Floor, Richmond, California 94804

Mission and Goals

The mission of the Clinical Science programs is to provide high-quality education and professional preparation in cytotechnology and medical technology for a diverse student population, to prepare them for traditional and emerging roles as clinical science professionals. The goals of each of the programs, in addition to preparing entry-level clinical practitioners, are to:

- Produce clinical scientists who can research, develop, evaluate, and implement clinical skills and procedures utilizing a high degree of independent judgment and applied cognitive knowledge.
- Consult, where appropriate, with other members of the healthcare team; and
- Instill within graduates a sense of professionalism, dedication, and commitment to healthcare and their profession that will stay with them throughout their careers.

Undergraduate Programs

Bachelor

- Clinical Science, Bachelor of Science (https://catalog.csudh.edu/academics/clinical-science/clinical-science-bs/)

Post Baccalaureate Programs

Post Baccalaureate Certificates

- Clinical Science - Cytotechnology, Post-Baccalaureate Certificate (https://catalog.csudh.edu/academics/clinical-science/clinical-science-cytotechnology-post-baccalaureate-certificate/)
- Clinical Science - Medical Technology, Post-Baccalaureate Certificate (https://catalog.csudh.edu/academics/clinical-science/clinical-science-medical-technology-post-baccalaureate-certificate/)

Faculty

Payman Nasr, Ph.D., MT ASCP - Department Chair

Jahangir Abdi, Ph.D., ASCP

Sarah Turkel, MS, MPH, MT(ASCP), CIC, FAPIC - Postbaccalaureate Medical Technology Certification Program Director

Program Office: Welch Hall A-330, (310) 243-3748

Emeriti Faculty

Cheryl Jackson-Harris

Courses

CLS 301. Intro Clin Lab Proced Lec. (2 Units)
Prerequisite: BIO 122 required. Demonstration and practice of specialized techniques used in the clinical setting. Theory of arterial, capillary and venipuncture including complications. Processing body fluids. Review of state/federal laws, biohazards and quality assurance. Oral and/or written reports/projects.
Offered Fall, Spring

CLS 302. Clinical Practice Lab. (1 Units)
Prerequisites: BIO 122; CLS 301 or concurrent enrollment required. Practice in clinical laboratory techniques: phlebotomy; serum, plasma and whole blood preparation for testing; Minimum 90 hours training at a clinical affiliate under University Faculty supervision. Written report(s).
Offered Fall, Spring

CLS 303. Radiation Science. (3 Units)
Prerequisites: MAT 171 and HSC 201. Overview of radiation science: history, radiation physics, instrumentation, protection and safety. Applications to clinical procedures utilizing radionuclides. Problem solving.
Offered As needed

CLS 304. Introduction to Urinalysis and Body Fluids. (3 Units)
Prerequisite: BIO 122 and CHE 112 or equivalent is required. An introduction to the analysis of urine and body fluids used in the clinical setting. Discussion of the theory and diagnostic applications relative to the analysis of urine and body fluids. Demonstration of lab techniques with limited lab practice.
Offered Fall, Spring

CLS 305. Rad Biology & Protection. (1 Units)
Prerequisite: Admission to the clinical year. Modes of radioactive decay, photon radiation, interaction of radiation with matter, biologic effects of radiation, decontamination techniques, government regulations. Problem solving. Report writing. Oral and/or written reports/projects.
Offered As needed

CLS 306. Clin Immun & Immunohem. (4 Units)
Prerequisites: BIO 250; CLS 301 or concurrent enrollment required. Theory and practice of serologic techniques; nature of antigens, antibodies and the immune response. Genetics of red cell antigens. Pre-natal, neonatal, and pre transfusion testing. Cause, investigation and prevention of HDNB. Compatibility testing and investigation of transfusion reactions. Case studies. Written reports. Three hours of lecture and three hours of laboratory per week.
Offered Spring

CLS 307. Clinical Hematology. (4 Units)
Prerequisites: BIO 250; CLS 301 or concurrent enrollment required. The goal of this course is to provide the student with the basic theoretical foundation of Clinical Hematology relative to the scope of practice for an entry level Clinical Laboratory Scientist. The student will first focus on normal blood cell development (hematopoiesis), then normal cell function, leading into abnormal function and the pathogenesis of hematological disorders. The course emphasis is on recognition of normal and abnormal laboratory results and interpretation of clinical data used in the diagnostic process. The course is broken down into four main sections: starting with an overview of the clinical hematology laboratory and hematopoiesis; then erythropoiesis and disorders primarily involving red cells; followed by normal leukopoiesis, non-malignant leukocytes, and related disorders; and lastly the study of malignant leukocyte disorders and platelets. Students will describe and analyze the process of Hematopoiesis. Disciplinary writing will be employed to produce case studies, written reports and analyze theory of hematology procedures. Application of course concepts will be used to enumerate and identify blood cells. Emphasis will be placed on the identification and description of detection of abnormalities and on the demonstration of special equipment and techniques. The proposed Student Learning Outcomes (SLO) are as follows. 1. Demonstrate the ability to perform clinical diagnostic testing, evaluate outcomes, and generate a written report in order to solve problems related to pre-analytical, analytical, and post-analytical components of services in the clinical laboratory. 2. Employ health professional discourse and proper medical terminology to facilitate communication on laboratory findings pertaining to hematology. 3. Identify, read, and interpret published studies in clinical hematology in order to describe, evaluate, and report the clinical laboratory findings. 4. Identify and analyze the principles of hematology and generate written reports that address laboratory findings. 5. Communicate effectively about hematology across medical professions, including physician, nursing, and other specializations.
Offered Fall

CLS 308. Pathophys for Hlth Professions. (3 Units)
Prerequisite: BIO 250 and either BIO 251, CHE 112, or equivalent. Principles of clinical pathophysiology, including assessment of clinical data necessary for identifying the causes of diseases and evaluating the underlying mechanisms of pathologic processes. Discussion of immune disorders, inflammation, neoplasia and genetic disorders. Review of the individual organ system and associated pathology. Case studies, written/and or oral reports.
Offered All terms, Fall

CLS 310. Coagulation and Hemotasis. (2 Units)
Prerequisite(s): CLS 301 and CLS 304. Recommended co-requisite(s): CLS 307. This course provides an in-depth study of the mechanisms, disorders, and diagnostic evaluation of coagulation and hemostasis, focusing on their clinical relevance in the laboratory setting. Topics include the physiology of primary and secondary hemostasis, coagulation pathways, platelet function, fibrinolysis, and the regulation of clot formation. Emphasis will be placed on inherited and acquired coagulation disorders, anticoagulant therapy, and laboratory methods used to assess hemostatic function. Students will analyze case studies and clinical scenarios to develop their ability to interpret laboratory data related to coagulation. The course emphasizes the role of diagnostic testing in identifying coagulation abnormalities, monitoring anticoagulant therapies, and guiding clinical decision-making. Quality control practices, regulatory standards, and advances in coagulation diagnostics will also be discussed.
Offered Fall, Spring, Summer

CLS 311. Transfusion Medicine. (3 Units)
Prerequisite(s): BIO 250, CLS 301, CLS 306. This course delves into transfusion medicine and blood banking, covering theoretical foundations and practical applications. Students will study blood group systems, antibody identification, transfusion practices, and quality management. The laboratory component will provide hands-on experience in critical blood banking techniques, preparing students for careers in clinical laboratory science. Fee required.
Offered Fall, Spring

CLS 312. Parasitic Diseases in Clinical Practice. (3 Units)
Prerequisite(s): CLS 301, CLS 304, and BIO 324 or concurrent enrollment. This course focuses on the clinical relevance of parasitic diseases, emphasizing diagnosis, treatment, and prevention in healthcare settings. Topics include host-parasite interactions, molecular diagnostic methods, drug resistance, and the management of parasitic infections in diverse populations. Students will develop the ability to integrate laboratory data with clinical presentations to support evidence-based decisions in clinical practice. Fee required.
Offered Fall, Spring

CLS 401. Overview: Virology/Mycology. (2 Units)
Prerequisites: BIO 324 or concurrent enrollment; CLS 301 is recommended. Brief introduction to special pathogens for students preparing for the clinical virology and mycology rotations in the clinical laboratory.
Offered Spring

CLS 410. Nml: Imaging Techniques. (5-6 Units)
Prerequisite: Admission to the clinical year. Use of nuclear medicine equipment in a clinical setting to visualize organs, determine function of organs and organ systems.
Offered As needed

CLS 411. Nml: Radiopharm/Assay. (4 Units)
Prerequisite: Admission to the clinical year. Preparation of radionuclides for administration in diagnostic testing including radio- chemical purity, quantitative assay and sterility. Radioassay techniques: calibration and use of instruments, specimen collection. Quality assurance.
Offered As needed

CLS 412. Nml: Instru/In Vivo. (4 Units)
Prerequisite: Admission to the clinical year. Performance of procedures utilizing radionuclides for in-vivo studies. Instrument calibration, preventive maintenance. Computer applications.
Offered As needed

CLS 413. Nml: Special Studies. (2 Units)
Prerequisite: Admission to the clinical year. Practicum in special studies of interest related to nuclear medicine. Project and written report. Repeatable course.
Offered As needed

CLS 420. Cnm: Imaging Techniques. (3 Units)
Prerequisite: Admission to the clinical year. Principles of stationary and moving imaging with correlations to pathophysiology in human organs and systems.
Offered As needed

CLS 421. Cnm: Radiopharm/Assay. (2 Units)
Prerequisite: Admission to the clinical year. Theory of radiopharmaceutical applications: radionuclides, dose calibration. Principles of saturation analysis and competitive protein binding, correlations of biochemistry, pathophysiology, radioassay techniques, principles and applications to individual techniques. Quality assurance.
Offered As needed

CLS 422. Cnm: Instru/In Vivo Tech. (2 Units)
Prerequisite: Admission to the clinical year. Instrumentation including Geiger-Mueller tubes, rectilinear scanners, scintillation spectrometers and gamma cameras. In-vivo techniques including Schilling test, blood volume, time dependent studies, erythrokinetics, gastrointestinal loss studies.
Offered As needed

CLS 423. Cnm: Special Studies. (1 Units)
Prerequisite: Admission to the clinical year. Special studies including ultrasound, radiotherapy and nuclear magnetic resonance. Repeatable course.
Offered As needed

CLS 430. Clin Micro Lab. (3-4 Units)
Prerequisite: Admission to the clinical year. Techniques and practice in medical microbiology including parasitology, mycology, and bacteriology at a clinical affiliate. Oral and/or written reports/projects.
Offered Fall

CLS 431. Clin Chemistry Lab. (3-4 Units)
Prerequisite: Admission to the clinical year. Techniques and practice in chemistry at a clinical affiliate. Oral and/or written reports/projects.
Offered Fall

CLS 432. Clin Hem/Urinalysis Lab. (4 Units)
Prerequisite: Admission to the clinical year. Techniques and practice in hematology and urinalysis at a clinical affiliate. Oral and/or written reports/projects.
Offered Spring

CLS 433. Clin Immunohem/Sero Lab. (3 Units)
Prerequisite: Admission to the clinical year. Techniques and practice in serology, immunology and blood banking at a clinical affiliate. Oral and/or written reports/projects.
Offered Spring

CLS 434. Clin Special Proc Lab. (1 Units)
Prerequisite: Admission to the clinical year. Techniques and practice in special procedures at a clinical affiliate. Oral and/or written reports/projects. Repeatable course.
Offered Spring

CLS 440. Correl Clin Micro. (2 Units)
Prerequisite: Admission to the clinical year. Theory and correlations of pathophysiology in medical microbiology including mycology, parasitology and bacteriology.
Offered Spring

CLS 441. Correl Clin Chem. (2 Units)
Prerequisite: Admission to the clinical year. Theory and practical aspects correlating clinical chemistry with pathophysiology.
Offered Spring

CLS 442. Correl Clin Hem-Urinalysis. (2 Units)
Prerequisite: Admission to the clinical year. Theory and practical applications correlating hematology and urinalysis to pathophysiology.
Offered Fall

CLS 443. Correl Clin Imunohem-Sero. (2 Units)
Prerequisite: Admission to the clinical year. Theory and practical applications correlating serology, immunology and blood banking to pathophysiology.
Offered Fall

CLS 450. Micro: Fem Genit Tract. (4 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Microscopic examination of cytologic and histologic material of benign and malignant disease processes from the female genital tract, including microbiology, hormonal effects and response to therapy.
Offered Fall

CLS 451. Micro: Resp & Gi Tract. (2 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Microscopic examination of cytologic and histologic material of benign and malignant disease processes from the respiratory and gastrointestinal tracts.
Offered Fall

CLS 452. Micro: Gu Tract/Body Cav Fluid. (2 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Microscopic examination of cytologic and histologic material of benign and malignant disease processes of the genitourinary system and body cavity fluids.
Offered Fall

CLS 453. Micro: Fine Needle Aspir. (2 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Microscopic examination of cytologic and histologic material of benign and malignant disease processes in aspirated material.
Offered Spring

CLS 454. Micro: Systems Overview. (4 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Cytologic examination of gynecologic and non-gynecologic material from all body sites for diagnostic purposes.
Offered Spring

CLS 455. Cytologic Preparation. (2 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Current methods of processing and staining material for cytologic study. Techniques utilized in obtaining non-gynecologic material for cytologic evaluation.
Offered Spring

CLS 460. General Cytology. (3 Units)
Prerequisite: Admission to the clinical year in cytotechnology. General cytology, cytogenetics, and electron microscopy. Basic principles of pathology and cytology as they apply to malignancy. Anatomy, histology, pathology and cytopathology of the female genital tract, including microbiology, hormonal effects and response to therapy.
Offered Fall

CLS 461. Cyto Res & Gi Tract. (2 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Normal and abnormal cytology of the respiratory and gastrointestinal tracts with emphasis on anatomical and histological pathology.
Offered Spring

CLS 462. Cyto Gu Body C Fluids. (2 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Normal and abnormal cytology of the genitourinary system and body cavity fluids with emphasis on anatomical and histological pathology.
Offered Spring

CLS 463. Fine Needle Aspirat Cytol. (1 Units)
Prerequisite: Admission to the clinical year in cytotechnology. Normal and abnormal aspiration cytology of the major organs with emphasis on anatomical and histological pathologies.
Offered Spring

CLS 490. Seminar In Clinical Sciences. (1 Units)
Prerequisites: CLS 301 and CLS 306 required; and all lower division Clinical Science Program required. Presentation and discussion of pertinent topics from clinical science trade journals. Written and oral presentations. One hour of seminar per week.
Offered As needed

CLS 491. Management Skills in Clinical Sciences. (3 Units)
Prerequisites: Admission to Clinical Internship; CLS 301 is recommended. Discussion of current and emerging theories, concepts and trends relevant to the management of clinical laboratories, including compliance, professional development, training and educational methodologies. Student projects, written an oral reports are required.
Offered All terms, Spring

CLS 492. Research Methods in Clinical Science. (3 Units)
Prerequisite: Admission to Clinical Internship; MAT 131 is recommended. Overview of relevant theoretical concepts, methods and applications utilized in clinical science research. Application of research methods to the development and design of research proposal. Critical analysis of literature review, data, and published research studies in clinical sciences.
Offered All terms, Fall

CLS 494. Independent Study in Clinical Science. (1-3 Units)
Course of study designed cooperatively by student and instructor to accomplish individualized learning objectives that are appropriate to the clinical laboratory. Consent of instructor required. CR/NC grading.
Offered Fall, Spring

CLS 501. Clinical Sciences: Team Concept. (3 Units)
Prerequisite: HEA 201. Analysis of the current status and problems in health care delivery including management, staffing and health economics; development of a realistic model. Role of allied health professionals in health care delivery; scientific medicine vs. holistic health; prevention and health education. Coordination of the clinical sciences into an effective health care team. To successfully complete this class, students must demonstrate proficiency to the satisfaction of the instructor in oral and written communication skills in the English language. Oral and/or written reports/projects.
Offered As needed

CLS 502. Management Concepts in the Clinical Sciences. (3 Units)
Prerequisite: HEA 201. Managerial function, organization, and structure. A pragmatic approach to the strategies and tactics available to the professional manager. Special projects in work sampling, workload recording and time management for health care professionals. Oral and/or written reports/projects.
Offered As needed

CLS 503. Clinical Diagnosis. (3 Units)
By use of case studies, interpretation of clinical data, correlation of history and physical to diagnosis, treatment and follow-up protocols. Student case study investigation. Two hours of lecture and two hours of activity per week.
Offered As needed

CLS 504. Data Collect & Process. (3 Units)
Prerequisite: CSC 111 or equivalent. Collection, storage and retrieval of data, with emphasis on clinical applications. Modern information systems and evaluation of such systems from the clinical science management view point. Oral and/or written reports/projects. Two hours of lecture and two hours of activity per week.
Offered As needed

CLS 505. Stat Analysis & Research. (3 Units)
Prerequisite: MAT 131. Application of statistical analysis in the clinical and health sciences, including normal and binomial distribution, t-tests, chi square tests, analysis of variance, linear regression and correlation. Student project required. Two hours of lecture and two hours of activity per week
Offered As needed

CLS 590. Graduate Seminar. (1-2 Units)
Prerequisites: CLS 501, CLS 502 and CLS 503 or consent of instructor. Seminar methods and use of the literature in the clinical sciences. Faculty and student directed discussions of contemporary clinical science issues. Participants present and interpret recent publications. Written abstracts. Repeatable up to 6 units. One hour of seminar per week.
Offered As needed

CLS 594. Ind Study In Clin Sci. (1-3 Units)
Prerequisite: Consent of instructor and advisor. Independent and original laboratory or field investigation under supervision of a faculty member.
Offered As needed

CLS 595. Special Top:. (1-3 Units)
Prerequisite: Health Care Practitioner. Advanced topics of special interest to Clinical Science majors possessing health care credentials. Topic and content will vary as announced.
Offered As needed

CLS 596. Internship. (1-6 Units)
Prerequisite: Graduate standing; CLS 501 and 502 recommended. Students will be directed to health care facilities to serve as interns within their chosen specialization. Teaching opportunities may be available in a variety of settings. Regular meetings are scheduled with a faculty internship supervisor to assess student progress. Written report required. Course designed for graduate students in the Clinical Sciences. Repeatable course.
Offered As needed

CLS 599. Grad Capstone Activity. (1-3 Units)
Prerequisites: Graduate Writing Assessment Requirement; advancement to candidacy, and completion of all required core courses. Department approval of advisor and project. Students will choose either a thesis, project or comprehensive examination in consultation with their advisor.
Offered As needed

CLS 600. Grad Continuation Course. (1 Units)
Graduate students who have completed course work but not their thesis, project, or comprehensive examination, or who have other requirements remaining for completion of their degree, may maintain continuous attendance by enrolling in this course. Signature of graduate program coordinator required.
Offered Fall, Spring