

# DEPARTMENT OF CHEMISTRY

## Overview

Dr. Natalie Mikita, Chairperson  
nmikita@missouriwestern.edu  
(816) 271-4392  
missouriwestern.edu/Chemistry (<https://www.missouriwestern.edu/chemistry/>)

The Department of Chemistry deals with a core of knowledge essential to much of the scientific experimentation that influences our daily lives. From atomic theories to basic chemical structures, the prospective chemist studies the material which forms a basis for important work in engineering, pharmacy, medicine, medical technology, dentistry, and research chemistry. The chemistry program is approved by the American Chemical Society (ACS); students completing the proper ACS curriculum will thus be certified by the society and department. The department also assists in the preparation of prospective science teachers. These students, as well as those who study chemistry as part of their basic education, work in modern facilities fully equipped for investigating contemporary chemistry topics.

## Majors

- Biochemistry and Molecular Biology (Bachelor of Science, B.S.) (<http://catalog.missouriwestern.edu/undergraduate/science-and-health/chemistry/biochemistry-molecular-biology-bs/>)
- Chemistry (Bachelor of Science, B.S.) (<http://catalog.missouriwestern.edu/undergraduate/science-and-health/chemistry/chemistry-bs/>)
- Medical Laboratory Science (Bachelor of Science, B.S.) (<http://catalog.missouriwestern.edu/undergraduate/science-and-health/chemistry/medical-laboratory-science-bs/>)

## Microcredential

- Laboratory Technician Pre-Apprenticeship (<http://catalog.missouriwestern.edu/undergraduate/science-and-health/chemistry/laboratory-technician-pre-apprenticeship-microcredential/>)

## Minors

- Chemistry Minor (<http://catalog.missouriwestern.edu/undergraduate/science-and-health/chemistry/chemistry-minor/>)
- Entrepreneurship Minor (<http://catalog.missouriwestern.edu/undergraduate/interdisciplinary-studies/entrepreneurship-minor/>)

## Courses Chemistry (CHE)

**CHE 101 Introductory Chemistry Credits: 4**

**Typically Offered:** Fall, Spring.

**Course Description:** Chemistry for liberal arts and sciences students; meets the minimum physical science requirement. Three hours lecture, two hours lab.

**CORE 42:** MOTR CHEM 100L; Essentials in Chemistry with Lab (attributes MO33, MLAB)



**CHE 111 General Chemistry I Credits: 5**

**Typically Offered:** Fall, Spring.

**Course Description:** Basic concepts of chemistry: atomic theory and periodic system, chemical calculations, oxidation-reduction, states of matter, theory of chemical bonding, atomic structures. Four hours lecture, three hours lab. **Prerequisite(s):** ACT Math subscore of at least 22 or a grade of C or higher in MAT 110E or score of 70 or higher on the MWSU Math Placement Exam, or the equivalent.

**CORE 42:** MOTR CHEM 150L; Chemistry with Lab (attributes MO33, MLAB)



**CHE 112 Problem Solving for General Chemistry I Credits: 1**

**Typically Offered:** Fall, Spring.

**Course Description:** Elective course to accompany CHE111 General Chemistry I. Focused instruction on problem solving strategies and tools associated with course content of General Chemistry I. Topics include symbolic chemical language, mathematics of General Chemistry, unit conversions and unit analysis, essential graphing, word problem strategies, employing technology to solve problems, and critical analysis of results. This course must be taken concurrently with CHE 111. Graded on a pass/fail basis.

**CHE 120 General Chemistry II with Qualitative Analysis Credits: 5**

**Typically Offered:** Fall, Spring.

**Course Description:** Continuation of CHE 111. Thermochemistry, equilibrium, electrochemistry, radiochemistry, coordination chemistry, and a survey of the main group elements and their compounds. Laboratory includes the topics above along with the separation and identification of some of the more common anions and cations by qualitative analysis. Four hours lecture, three hours laboratory. **Prerequisite(s):** A grade of C or higher in CHE 111 and a grade of C or higher in MAT 116, or a Math score ACT of 25 or higher, or the equivalent.

**CHE 121 Problem Solving for General Chemistry II Credits: 1**

**Typically Offered:** Fall, Spring.

**Course Description:** Elective course to accompany CHE120 General Chemistry II. Focused instruction on problem solving strategies and tools associated with course content of General Chemistry II. Topics include mathematics of General Chemistry II including applications of algebra for solving problems in kinetics, thermodynamics and chemical equilibria, and solving complex word problems. This course must be taken concurrently with CHE 120. Graded on a pass/fail basis.

**CHE 150 Basic Laboratory Skills Credits: 2**

**Typically Offered:** Summer.

**Course Description:** An immersive laboratory experience in which students learn basic chemical laboratory skills that will prepare them for a laboratory apprenticeship experience. Skills include laboratory safety, chemical and waste management, use of a balance, use of calibrated glassware and equipment, preparation of solutions, use of basic laboratory instrumentation, and titration. **Prerequisite(s):** A grade of C or higher in BIO 101, BIO 105, or BIO 106, a grade of C or higher in CHE 111, and a grade of C or higher in MAT 116.

**CHE 283 Introduction to Research Methods in Chemistry Credits: 1-3**

**Typically Offered:** Departmental Discretion.

**Course Description:** Introduction to basic research in chemistry. Individual and team projects involving methods for solving chemistry-related research problems. May be repeated for credit. **Prerequisite(s):** High school chemistry, freshman or sophomore standing, and departmental approval.

**CHE 290 Chemical Laboratory Apprenticeship I Credits: 1****Typically Offered:** Fall, Spring, Summer.**Course Description:** Immersive on the job laboratory training experience with a Chemical Laboratory Technician Apprenticeship partner organization. This course may be repeated until a total of 2000 hours of on the job training have been completed. **Prerequisite(s):** Successful completion of the Laboratory Technician Pre-Apprenticeship Microcredential and departmental approval.**CHE 295 Colloquium in Chemistry Credits: 1****Typically Offered:** Departmental Discretion.**Course Description:** An introduction to careers in chemistry and chemistry related fields. Breadth of career paths and educational requirements for those paths will be emphasized. **Prerequisite(s):** Freshman or sophomore standing, or departmental approval.**CHE 308 History and Philosophy of the Natural Sciences Credits: 3****Typically Offered:** Spring.**Course Description:** A study of the history of the natural sciences with an emphasis on the philosophical analysis of these events. Same as BIO 308 and PHL 308. **Prerequisite(s):** Completion of General Studies Mathematics and Natural Sciences requirements.**CHE 310 Organic Chemistry I Credits: 3****Typically Offered:** Fall, Spring.**Course Description:** Methods of synthesis of organic compounds, reaction paths, chemical bonding, and geometry of organic molecules; aliphatic and aromatic compounds. Topics include substitution, elimination, and electrophilic addition reactions and mechanisms along with an overview of functional groups. Three hours lecture.**Prerequisite(s):** A grade of C or higher in CHE 120.**CHE 311 Organic Chemistry Laboratory I Credits: 2****Typically Offered:** Fall, Spring.**Course Description:** Laboratory course to accompany CHE 310 Organic Chemistry I lecture. Six hours lab. **Prerequisite(s):** Credit or concurrent enrollment in CHE 310.**CHE 312 Organic Chemistry II Credits: 3****Typically Offered:** Fall, Spring.**Course Description:** Reactions, mechanisms and methods of synthesis of organic compounds. Topics include oxidation & reduction, conjugated & aromatic systems, aromatic substitution, amines, carboxylic acids and derivatives, carbonyl compounds, polymerization and carbohydrates. Three hours lecture. **Prerequisite(s):** A grade of C or higher in CHE 310 and CHE 311.**CHE 313 Organic Chemistry Laboratory II Credits: 2****Typically Offered:** Fall, Spring.**Course Description:** Laboratory course to accompany CHE 312. Six hours lab. **Prerequisite(s):** Credit or concurrent enrollment in CHE 312.**CHE 321 Quantitative Analysis Credits: 4****Typically Offered:** Fall.**Course Description:** Analytical chemistry; gravimetric, volumetric, colorimetric, and electroanalytical determinations. Two hours lecture, six hours lab. **Prerequisite(s):** A grade of C or higher in CHE 120.**CHE 326 Instrumental Analysis Credits: 4****Typically Offered:** Spring.**Course Description:** Theories and methods in modern instrumental analysis. Three hours lecture, three hours lab. **Prerequisite(s):** A grade of C or higher in CHE 310, CHE 311, and CHE 321.**CHE 340 Foundations of Physical Chemistry Credits: 4****Typically Offered:** Fall.**Course Description:** A foundational course in Physical Chemistry covering thermodynamics, chemical equilibrium, properties of solutions, electrochemistry, kinetic theory of gases, and chemical kinetics. **Prerequisite(s):** A grade of C or higher in CHE 310, CHE 311, PHY 110, and MAT 167.**CHE 370 Biochemistry I Credits: 4****Typically Offered:** Fall, Spring.**Course Description:** An introduction to biological compounds their roles within cells and biological systems with an emphasis on structure and function, energy and metabolism, and biological storage of information. Three hours lecture, three hours lab. CHE 312 recommended. **Prerequisite(s):** A grade of C or higher in CHE 310 and CHE 311.**CHE 380 Environmental Chemistry & Chemical Management Credits: 3****Typically Offered:** Spring (odd-numbered years).**Course Description:** Study of environmental chemistry as it affects the operation of chemical facilities in a global society and the application of chemical knowledge to important current problems, including safe chemical storage and waste management. This course will provide background for understanding the demands of the chemical industrial workplace or for advanced study of these topics. **Prerequisite(s):** A grade of C or higher in CHE 310, CHE 311, and CHE 321.**CHE 420 Chemistry Laboratory Assistantship Credits: 1,2****Typically Offered:** Fall, Spring, Summer.**Course Description:** A laboratory assistant experience within a teaching laboratory. This experience may not be substituted for other courses required in the student's major area. Course grades are assigned on a pass/fail basis. May be repeated for credit. **Prerequisite(s):** A grade of C or higher in CHE 111 and department approval.**CHE 426 Instrumental Methods Credits: 5****Typically Offered:** Departmental Discretion.**Course Description:** Modern methods of chemical instrumentation; includes both practical application; and fundamental theories of instrumental analyses. Three hours lecture, six hours lab. **Prerequisite(s):** CHE 321 and CHE 340.**CHE 441 Advanced Inorganic Chemistry Credits: 3****Typically Offered:** Spring (even-numbered years).**Course Description:** Modern concepts of inorganic chemistry, encompassing chemical bonding theories, acid-base theories, mechanisms of inorganic chemistry, symmetry in molecules, inorganic thermodynamics, and atomic and molecular structure. Three hours lecture. **Prerequisite(s):** CHE 310 and CHE 311.**CHE 442 Inorganic Synthesis Credits: 1****Typically Offered:** Departmental Discretion.**Course Description:** Selected synthetic techniques involving inert atmosphere, non-aqueous solvents, vacuum manipulation, and electrolytic oxidation, as currently applied to the purification and characterization of a wide variety of inorganic materials. Three hours lab. **Prerequisite(s):** CHE 310, CHE 311, and credit or concurrent enrollment in CHE 441.

**CHE 445 Advanced Topics in Chemistry Credits: 3****Typically Offered:** Departmental Discretion.**Course Description:** Advanced material in Organic, Inorganic, Physical, Analytical, or Biochemistry, taught on a rotational basis. Specific topics may include, but are not limited to: Applied Spectroscopy, Chemical Kinetics, Macromolecular Chemistry (Polymers), Physical Inorganic Chemistry, Applied Chromatography, Advanced Organic Chemistry, or Advanced Biochemistry. This course may be repeated for credit for multiple topics. **Prerequisite(s):** CHE 312 and CHE 340.**CHE 450 Independent Research/Project Credits: 1-5****Typically Offered:** Fall, Spring, Summer.**Course Description:** Investigation of a research problem, project, or topic on an individual conference basis. May be repeated for credit.**Prerequisite(s):** Minimum of 2.5 GPA in major field, and departmental approval.**CHE 465 Chemistry Teaching: Methods and Techniques Credits: 3****Typically Offered:** Departmental Discretion.**Course Description:** Modern techniques in teaching high school chemistry: use of multimedia equipment, project approach, lesson planning, accreditation standards at state and national levels, and difficulties in chemistry instruction at the secondary level.**Prerequisite(s):** CHE 310 or departmental approval.**CHE 470 Biochemistry II Credits: 3****Typically Offered:** Spring (even-numbered years).**Course Description:** Continuing study of the biochemical basis of biological systems with a more expansive understanding of biomolecular structure and function, the interaction of biological molecules, energy and intermediary metabolism, biological signaling, and methods used for biochemical study. Three hours lecture. CHE 312 recommended.**Prerequisite(s):** A grade of C or higher in CHE 370.**CHE 475 Internship in Chemistry Credits: 1-3****Typically Offered:** Fall, Spring, Summer.**Course Description:** An extracurricular experience related to a unique approved chemistry career experience or a preprofessional experience. Course grades assigned on a Pass/Fail basis. May be repeated for credit. **Prerequisite(s):** Junior or Senior standing, a declared major in the Department of Chemistry, and departmental approval.**CHE 480 Advanced Physical Chemistry Credits: 4****Typically Offered:** Spring (odd-numbered years).**Course Description:** Second course in physical chemistry covering quantum chemistry, spectroscopy, bonding, and statistical thermodynamics. **Prerequisite(s):** Grade of C or better in CHE 340, PHY 111, and either MAT 177 or MAT 287.**CHE 485 Chemistry Capstone Experience Credits: 2****Typically Offered:** Fall.**Course Description:** A capstone laboratory experience. Covering research methodology, project planning, use of the chemical literature, experimentation, and scientific presentations with a mesoscale, supramolecular, nanoscale (MSN) focus. **Prerequisite(s):** A grade of C or higher in CHE 310, CHE 311, and CHE 321.**CHE 490 Research in Chemistry Credits: 1-3****Typically Offered:** Fall, Spring Summer.**Course Description:** Original research on problems in various fields of chemistry. Hours arranged. May be repeated for credit. Students are expected to work a minimum of 3 hours per week for each credit hour enrolled. A presentation of the work is required at the end of each enrolled term. A summary of the work will be provided to the research advisor (irrespective of credit hours) and written reports of the work must be submitted for research projects involving 2 or more credit hours. **Prerequisite(s):** CHE 310 and CHE 311 or consent of department chairperson.

## Clinical Laboratory Science (CLS)

**CLS 407 Clinical Laboratory Operations Credits: 2****Typically Offered:** Summer.**Course Description:** This course provides a basic introduction to the theory, practical application, technical performance and evaluation of laboratory skills specific to the practice of clinical laboratory science. Laboratory safety; microscopy; pipetting; general laboratory equipment; quality control; mathematics; phlebotomy; pre-analytic, analytic and post-analytic processes, including specimen collection, processing and transport to maintain test result integrity, will be addressed.**Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.**CLS 408 Introduction to Clinical Hematology Credits: 2****Typically Offered:** Summer.**Course Description:** This course introduces the theory, practical application, technical performance and evaluation of hematological and hemostasis procedures. Correlation of laboratory data with the diagnosis of erythrocyte, leukocyte and bleeding/clotting disorders will be introduced. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.**CLS 409 Introduction to Clinical Microbiology Credits: 2****Typically Offered:** Summer.**Course Description:** This course introduces the theory, practical application, technical performance and evaluation of procedures for isolation, identification and susceptibility testing of infectious disease organisms in humans. The course primarily focuses on bacteriology, but will include introductory coverage of parasitology, mycology and virology. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.**CLS 410 Introduction to Clinical Chemistry and Urinalysis Credits: 1****Typically Offered:** Summer.**Course Description:** This course introduces the theory, practical application, technical performance and evaluation of basic laboratory skills and methods in clinical chemistry and urinalysis. The course focuses on the correlation of laboratory data with the diagnosis of renal conditions, but will include introductory coverage of carbohydrate, liver and protein conditions, as well as enzymes. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 411 Introduction to Clinical Immunohematology Credits: 1****Typically Offered:** Summer.

**Course Description:** This course introduces the theory, practical application, technical performance and evaluation of immunohematology procedures required to provide compatible blood components for transfusion. Methods for collection, processing, storage and transfusion of blood and blood components will be presented. Immunohematology procedures that assist in the diagnosis and management of hemolytic conditions will be introduced. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 412 Clinical Lab Science Theory, Application, and Correlation Credits: 5****Typically Offered:** Spring.

**Course Description:** This course includes the application, evaluation and correlation of laboratory procedures used in the diagnosis and treatment of common disease states. Opportunities for building critical thinking, problem solving, leadership, oral communication, professionalism, and team work skills are provided in small group clinical case discussions. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 413 Clinical Endocrinology and Toxicology Credits: 1****Typically Offered:** Fall.

**Course Description:** This course introduces the theory, practical application, and evaluation of clinical chemistry laboratory procedures. Correlation of clinical laboratory data with the diagnosis and treatment of endocrine disorders, toxicology disturbances and therapeutic drug monitoring is emphasized. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 414 Clinical Chemistry and Urinalysis I Credits: 2****Typically Offered:** Fall.

**Course Description:** This course expands on the theory, practical application, and evaluation of basic laboratory procedures introduced in CLS 407 Clinical Laboratory Operations and CLS 410 Introduction to Clinical Chemistry and Urinalysis, with an emphasis on common automated methodologies used in clinical chemistry and urinalysis laboratories. This course will focus on the interpretation, evaluation and correlation of clinical laboratory data with the diagnosis and treatment monitoring of carbohydrate, renal, hepatic, protein, cardiac, lipid/lipoprotein, major and minor electrolyte, enzyme, pancreatic-gastrointestinal and acid-base disorders. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 415 Clinical Chemistry and Urinalysis II Credits: 2****Typically Offered:** Spring.

**Course Description:** This course expands on the theory, practical application, and evaluation of laboratory procedures introduced in CLS 414 Clinical Chemistry and Urinalysis I and CLS 444 Clinical Core Laboratory Practical I. Correlation of clinical laboratory data with the diagnosis and treatment monitoring of carbohydrate, renal, hepatic, cardiac, lipid/lipoprotein, protein, major and minor electrolyte, trace element, enzyme, pancreatic-gastrointestinal and acid-base disorders; tumor markers; and inborn errors of metabolism is emphasized. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 416 Clinical Hematology I Credits: 2****Typically Offered:** Fall.

**Course Description:** This course expands on the theory, practical application, and evaluation of hematological and hemostasis procedures introduced in CLS 408 Introduction to Clinical Hematology and of basic laboratory skills in CLS 407 Clinical Laboratory Operations. Correlation of clinical laboratory data with the diagnosis and treatment of erythrocyte, leukocyte and bleeding/clotting disorders will be emphasized. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 417 Clinical Hematology II Credits: 2****Typically Offered:** Spring.

**Course Description:** This course expands on the theory, practical application, and evaluation of hematological and hemostasis procedures introduced in CLS 416 Clinical Hematology I and CLS 444 Clinical Core Laboratory Practicum I, and includes the analysis of cerebrospinal, synovial and serous fluids. Correlation of clinical laboratory data with the diagnosis and treatment of erythrocyte, leukocyte and bleeding/clotting disorders will be emphasized. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 418 Clinical Microbiology I Credits: 2****Typically Offered:** Fall.

**Course Description:** This course expands on the theory, practical application, and evaluation of procedures for isolation, identification and susceptibility testing of infectious disease organisms in humans introduced in CLS 409 Introduction to Clinical Microbiology and of basic laboratory skills in CLS 407 Clinical Laboratory Operations. The course primarily focuses on bacteriology, but will include coverage of parasitology, mycology and virology. Course content emphasizes the correlation of clinical laboratory data with the patient's diagnosis and treatment. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 419 Clinical Microbiology II Credits: 2****Typically Offered:** Spring.

**Course Description:** This course builds on the theory, practical application and evaluation of the procedures for isolation, identification and susceptibility testing of infectious disease organisms in humans introduced in CLS 418 Clinical Microbiology I and CLS 448 Clinical Microbiology Laboratory Practicum I. This course includes bacteriology, mycology, parasitology, and virology content, and will emphasize the correlation of clinical laboratory data with the patient's diagnosis and treatment. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 420 Clinical Immunology and Molecular Diagnostics Credits: 2****Typically Offered:** Fall.

**Course Description:** This course includes the theory, practical application, and evaluation of immunological components and infectious disease serology. The principles and methodologies used in the assessment of immunologically related disorders, including hypersensitivity reactions, autoimmune, immunoproliferative, immunodeficient disorders and infectious disease are included. The course emphasizes the correlation of clinical laboratory data with the patient's diagnosis and treatment. The theory and application of molecular diagnostic tools, such as polymerase chain reaction (PCR), nucleic acid probes, and microarrays are also addressed. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 422 Clinical Immunohematology I Credits: 2****Typically Offered:** Fall.

**Course Description:** This course expands on the theory, practical application, and evaluation of immunohematology procedures introduced in CLS 411 Introduction to Clinical Immunohematology and basic laboratory skills in CLS 407 Clinical Laboratory Operations. The primary focus will be on processes required to provide compatible blood components for transfusion. Processes for donor blood collection and blood component processing and storage will be discussed. Immunohematology procedures that assist in the diagnosis and management of hemolytic conditions will be addressed. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 423 Clinical Immunohematology II Credits: 2****Typically Offered:** Spring.

**Course Description:** This course expands on the theory, practical application, and evaluation of immunohematology procedures presented in CLS 422 Clinical Immunohematology I and CLS 442 Clinical Immunohematology Laboratory Practicum I. There is an emphasis on the application of immunohematology procedures used for the resolution of complex immunohematology problems. Proper selection of immunohematology procedures that assist in the diagnosis and management of hemolytic conditions will be discussed. Concepts in patient blood management and the adverse effects of transfusion will be presented. Quality management as it applies to transfusion medicine will be addressed. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 430 Clinical Laboratory Management I Credits: 2****Typically Offered:** Fall.

**Course Description:** This course introduces the theory, practical application and evaluation of laboratory management principles in healthcare, including safety, research, educational methodology, quality control, ethics, laboratory operations, point-of-care testing, scope of practice, and the job application process. Opportunities for building critical thinking, problem-solving, research, communication, professionalism, management and leadership skills are provided. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 431 Clinical Laboratory Management II Credits: 3****Typically Offered:** Fall.

**Course Description:** This course builds on CLS 430 Clinical Laboratory Management I, and includes the theory, practical application and evaluation of laboratory management principles in compliance and regulatory issues, test utilization, human resource management, written and oral communication, method evaluation, educational methodology, professionalism, quality improvement and financial resource management. Opportunities for building critical thinking, problem-solving, team work, communication, professionalism, management and leadership skills are provided. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 442 Clinical Immunohematology Laboratory Practicum I Credits: 1****Typically Offered:** Fall.

**Course Description:** This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical immunohematology procedures and preparation of blood components. Course content will include new skills and procedures, in addition to the skills and procedures presented in CLS 407 Clinical Laboratory Operations and CLS 411 Introduction to Clinical Immunohematology. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 443 Clinical Immunohematology Laboratory Practicum II Credits: 1****Typically Offered:** Spring.

**Course Description:** This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical immunohematology procedures and preparation of blood components. Course content will include new skills procedures, in addition to the skills and procedures presented in CLS 442 Clinical Immunohematology Laboratory Practicum I. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 444 Clinical Core Laboratory Practicum I Credits: 1****Typically Offered:** Fall.

**Course Description:** This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical hematology/hemostasis, chemistry and urinalysis procedures. Course content will include new skills and procedures and the application of automation and automatic verification techniques, building on the skills and procedures presented in CLS 407 Clinical Laboratory Operations, CLS 408 Introduction to Clinical Hematology and CLS 410 Introduction to Clinical Chemistry and Urinalysis. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 445 Clinical Core Laboratory Practicum II Credits: 1****Typically Offered:** Spring.

**Course Description:** This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical hematology/hemostasis, chemistry and urinalysis procedures. Technical content will include new skills and procedures, in addition to the skills and procedures presented in CLS 444 Clinical Core Laboratory Practicum I. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 448 Clinical Microbiology Laboratory Practicum I Credits: 1****Typically Offered:** Fall.

**Course Description:** This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical microbiology procedures. Course content will include new skills and procedures, in addition to the skills and procedures presented in CLS 407 Clinical Laboratory Operations and CLS 409 Introduction to Clinical Microbiology. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

**CLS 449 Clinical Microbiology Laboratory Practicum II Credits: 1****Typically Offered:** Spring.

**Course Description:** This course provides practical application in a clinical laboratory setting for the technical performance and evaluation of clinical microbiology procedures. Course content will include new skills and procedures, in addition to the skills and procedures presented in CLS 448 Clinical Microbiology Laboratory Practicum I. **Prerequisite(s):** Acceptance in UNMC Clinical Laboratory Training program.

## Medical Technology (MTE)

**MTE 412 Clinical Lab Science Theory, Applications and Correlation Credits: 5****Typically Offered:** Fall, Spring, Summer.

**Course Description:** This course includes the application, evaluation, and correlation of laboratory procedures used in the diagnosis and treatment of common disease states. Opportunities for building critical thinking, problem solving, leadership, oral communication, professionalism, and teamwork skills are provided in small group clinical case discussions and presentations. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 413 Applications of Chemistry for Clinical Lab Science Credits: 1**  
**Typically Offered:** Fall, Spring, Summer.

**Course Description:** This course incorporates advanced theory, practical application, and evaluation of clinical chemistry laboratory procedures. Correlation of clinical laboratory data with the diagnosis and treatment of endocrine disorders, toxicology disturbances and the therapeutic drug monitoring is emphasized. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 430 Clinical Microbiology Credits: 4-8**

**Typically Offered:** Fall, Spring, Summer.

**Course Description:** The theory and laboratory study of pathogenic bacteria, viruses, rickettsiae, fungi, and parasites; includes specimen handling, methods of isolation, cultivation, diagnostic procedures, asepsis, environmental monitoring, medical significance, and quality control. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 432 Clinical Chemistry Credits: 6-10**

**Typically Offered:** Fall, Spring, Summer.

**Course Description:** Identification and quantitation of specific chemical substances in blood and body fluids by various analytical techniques; clinical correlation with diagnosis and treatment of disease; principles of instrumentation; toxicology; and quality control. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 434 Clinical Hematology Credits: 3-7**

**Typically Offered:** Fall, Spring, Summer.

**Course Description:** Theory of blood cell formation; morphology of cellular constituents; disease states; hemostasis; and coagulation testing; includes techniques and instrumentation used to determine major hematological and clotting parameters and quality control procedures. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 436 Clinical Immunohematology Credits: 3-7**

**Typically Offered:** Fall, Spring, Summer.

**Course Description:** Studies the common blood group systems; principles and procedure for antigen-antibody detection; cross-matching; blood collection and preservation; processing; the evaluation of transfusion reaction; and quality control procedures. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 438 Clinical Immunology Credits: 1-6**

**Typically Offered:** Fall, Spring, Summer.

**Course Description:** Characteristics of antigen/antibody function and interaction; principles and procedures of humoral and cellular immune responses; performance of serological procedures; clinical correlation of abnormalities; and quality control. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 440 Clinical Urinalysis Credits: 1-3**

**Typically Offered:** Fall, Spring, Summer.

**Course Description:** Studies renal physiology and function in health and disease states; includes chemical and microscopic examination of urine, other excreta, and body fluids in relation to disease processes, along with quality control procedures. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

**MTE 442 Topics in Medical Technology Credits: 1-4**

**Typically Offered:** Fall, Spring, Summer.

**Course Description:** Subject matter may include the following: hospital orientation, laboratory management, radioisotope techniques, quality control procedures, laboratory safety, special projects, special techniques, and seminars on various subjects deemed necessary by hospital personnel. **Prerequisite(s):** Acceptance into Affiliate Clinical Lab Science Training Program.

## Faculty

**Sauna Hiley** (1997) Professor, Chemistry. Ph.D., University of Wyoming.

**Steven Lorimer** (1999) Associate Professor, Chemistry. Ph.D., Iowa State University.

**Natalie Mikita** (2016) Associate Professor, Chemistry. Ph.D., Case Western Reserve University.

**Jonathan Rhoad** (2006) Professor, Chemistry. Ph.D., The Ohio State University.

**Alcinda Ruuskanen** (2021) Instructor, Chemistry. M.S., University of Oulu (Finland).

**Stanislav Svojanovsky** (2013) Associate Professor, Chemistry. Ph.D., University of Kansas.

**Jeffrey Woodford** (2010) Professor, Chemistry. Ph.D., University of Nebraska-Lincoln.