

Department of Chemistry

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<http://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 accredited 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.

EXIT REQUIREMENTS FOR DEPARTMENT MAJORS

All students completing the Chemistry degree programs will be required to take the departmental exit exam consisting of the E.T.S. Major Field Test in Chemistry.

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Major in Chemistry

	<i>Credits</i>
CHE 111 General Chemistry	5
CHE 120 General Chemistry II with Qualitative Analysis	5
CHE 310 Organic Chemistry I	3
CHE 311 Organic Chemistry Laboratory I	2
CHE 312 Organic Chemistry II	3
CHE 313 Organic Chemistry Laboratory II	2
CHE 321 Quantitative Analysis	4
CHE 370 Biochemistry I	4
CHE 381 Physical Chemistry: Chem. Dynamics & Quantum Mech.	3
CHE 382 Physical Chemistry Lab: Chem. Dynamics & Quantum Mech.	2
CHE 383 Physical Chemistry: Thermodynamics	3
CHE 384 Physical Chemistry Lab: Thermodynamics	2
CHE 426 Instrumental Methods	5
CHE 441 Advanced Inorganic Chemistry	3
CHE 442 Inorganic Synthesis	2
CHE 495 Seminar in Chemistry	2
MAT 167 Calculus with Analytic Geometry I	5
MAT 177 Calculus with Analytic Geometry II	5
MAT 287 Calculus with Analytic Geometry III	5
PHY 210 University Physics I	5
PHY 211 University Physics II	5
Advanced Courses in Chemistry: Choose 2 courses	6
CHE 445 Advanced Topics in Chemistry (3)*	
CHE 470 Biochemistry II (3)	
CHE 490 Research in Chemistry (3)**	
TOTAL	81

*CHE445 may be repeated under two different topics for 6 credit hours in this category.

**To satisfy requirements in this category, CHE490 must consist of 3 credit hours on a single project that culminates in a single written report. The 3 credit hours do not have to be completed in a single semester.

Major in Natural Science/Chemistry

Students pursuing the Bachelor of Science degree majoring in Natural Science with a Chemistry concentration have four option areas available: Health Professions, Forensic Science, Education, and Chemical Business. The Natural Science curriculum consists of a core of courses taken by all majors followed by specified chemistry and cognate area courses to complete each option.

Core Requirements

	<i>Credits</i>
CHE 111 General Chemistry	5
CHE 120 General Chemistry II with Qualitative Analysis	5
CHE 310 Organic Chemistry I	3
CHE 311 Organic Chemistry Lab I	2
CHE 321 Quantitative Analysis	4
CHE 370 Biochemistry I	4
CHE 495 Seminar in Chemistry	2
PHY 110 & 111 College Physics I & II (8)	OR
PHY 210 & 211 University Physics I & II (10)	8 - 10
BIO 106 Principles of Cell Biology	4
MAT 167 Calculus w/ Analytic Geometry I (5)	5
TOTAL CORE	<hr/> 42-44

Natural Science/Chemistry: Forensic Science Option

	<i>Credits</i>
CHE 312 Organic Chemistry II	3
CHE 313 Organic Chemistry Laboratory II	2
CHE 326 Instrumental Analysis	4
CHE 340 Physical Chemistry for the Biological Sciences (4)	OR
*CHE 381/382 Physical Chemistry: Chem. Dynamics/Laboratory (5)	OR
*CHE 383/384 Physical Chemistry: Thermodynamics/Laboratory (5)	4-5
BIO 205 Genetics	4
LAW 100 Introduction to Criminal Justice	3
LAW 260 Criminal Law	3
LAW 275 Police Photography	2
LAW 280 Criminalistics	5
LAW 310 Criminal Investigation	3
LAW 320 Criminal Evidence	3
TOTAL OPTION	<hr/> 36-37
TOTAL CORE & OPTION	<hr/> 78-81

* The CHE381 or 383 physical chemistry options contains a minimum prerequisite of MAT177 and concurrent enrollment in PHY210.

Natural Science/Chemistry: Education Option

	<i>Credits</i>
CHE 326 Instrumental Analysis	4
CHE 340 Physical Chemistry for the Biological Sciences (4)	OR
*CHE 381 Physical Chemistry: Chem. Dynamics & Quantum Mech. (3)	OR
*CHE 383 Physical Chemistry: Thermodynamics (3)	3-4
CHE 380 Environmental Chemistry	3
CHE 308 History and Philosophy of the Natural Sciences	3
CHE 465 Chemistry Teaching: Methods & Techniques	3
ESC 111 Physical Geology	OR
ESC 120 Meteorology	4
EDU 202 Introduction to Teaching	3
EDU 203 Participation in Teaching I	1
EDU 225 Educational Psychology	2
EDU 303 Experience in Teaching II	2
EDU 304 Applied Methods and Management	3

EDU	311	Secondary Reading Techniques	2
EDU	315	Psychology & Educ. of the Exceptional Student	2
EDU	404	Seminar in Sec. Education & Human Relations	3
EDU	409	Student Teaching III (Secondary)	9
TOTAL OPTION			47-48
TOTAL CORE & OPTION			89-92

* The CHE381 or 383 physical chemistry options contains a minimum prerequisite of MAT177 and concurrent enrollment in PHY210. The CHE340 physical chemistry course requirement contains a minimum prerequisite of MAT167, which satisfies the Math requirement in the core for the Natural Science/Chemistry program.

Teacher Education students must also complete the General Studies requirements as listed under Secondary Education. The above requirements complete all Missouri Secondary Education Chemistry certification requirements. Unified Science certification requires the completion of both ESC111 and ESC120, and also completion of 4 more credit hours of biology (BIO105 or 205 are recommended).

Natural Science/Chemistry: Health Professions Option			<i>Credits</i>
CHE	xxx	Courses numbered 300 or higher	7
BIO	205	Genetics	4
BIO	311	Animal Physiology	4
BIO	xxx	Courses numbered 300 or higher	8
TOTAL OPTION			23
TOTAL CORE & OPTION			65-67

Natural Science/Chemistry: Chemical Business Option			<i>Credits</i>
CHE	326	Instrumental Analysis	4
CHE	340	Physical Chemistry for the Biological Sciences (4)	OR
*CHE	381/382	Physical Chemistry: Chem Dynamics/Laboratory (5)	OR
*CHE	383/384	Physical Chemistry: Thermodynamics/Laboratory (5)	4-5
CHE	380	Environmental Chemistry	3
ACC	201	Introductory Financial Accounting	3
ACC	202	Introductory Managerial Accounting	3
ECO	260	Principles of Macroeconomics	3
ECO	261	Principles of Microeconomics	3
GBA	210	Business Statistics I	3
GBA	211	Business Law I	3
GBA	220	Business Communications	3
MGT	305	Management of Organizations	3
MKT	301	Principles of Marketing	3
TOTAL OPTION			38-39
TOTAL CORE & OPTION			80-83

* The CHE381/382 or 383/384 physical chemistry options contains a minimum prerequisite of MAT177 and concurrent enrollment in PHY210.

Major in Biochemistry and Molecular Biology

The Bachelor of Science Major in Biochemistry and Molecular Biology is an interdisciplinary program offered jointly by the departments of Biology and Chemistry. It is designed to prepare students for graduate level education or careers in biochemistry, cell and molecular biology, and related biotechnology fields.

Students pursuing the Bachelor of Science degree majoring in Biochemistry and Molecular Biology are required to complete the following curriculum.

The following core courses are required:

Core Requirements			<i>Credits</i>
BIO	105	Principles of Organismal Biology	5
BIO	106	Principles of Cell Biology	4
BIO	205	Genetics	4
BIO	225	Evolutionary Ecology	4
BIO	331	Bioinformatics	2
BIO	431	Molecular Biology	4
CHE	111	General Chemistry	5
CHE	120	General Chemistry II with Qualitative Analysis	5
CHE	310	Organic Chemistry I	3
CHE	311	Organic Chemistry Laboratory I	2
CHE	321	Quantitative Analysis	4
CHE	340	Physical Chemistry for the Biological Sciences (4)	OR
CHE	383/384	Physical Chemistry Thermodynamics/Laboratory (5)	4-5
CHE	370	Biochemistry I	4
CHE	470	Biochemistry II	3
CHE	495	Seminar in Chemistry	2
PHY	110/111	College Physics I/II (8)	OR
PHY	210/211	University Physics I/II* (10)	8-10
MAT	167	Calculus with Analytic Geometry I	5
SUBTOTAL			<hr style="width: 100%; border: 0.5px solid black;"/> 68-71

*Prerequisite MAT177

CHE383 may not be used as an elective course if CHE340 is taken in the core requirements.

Electives: Complete a minimum of twelve (12) credits from Biology or Chemistry courses numbered 300 or higher from the following recommended list. Other Biology or Chemistry courses numbered 300 or higher may be substituted with prior departmental approval.

BIO	311	Animal Physiology (4)	
BIO	315	Medical Parasitology (4)	
BIO	340	Plant Physiology (4)	
BIO	390	Microbiology (4)	
BIO	410	Molecular Cell Biology (4)	
BIO	411	Developmental Biology (4)	
BIO	421	Immunology (4)	
BIO	430	Molecular Basis of Disease (4)	
BIO	450	Independent Research/Project (var.)	
CHE	312	Organic Chemistry II (3)	
CHE	313	Organic Chemistry II Laboratory (2)	
CHE	326	Instrumental Analysis (4)	
CHE	426	Instrumental Methods** (5)	
CHE	381/382	Physical Chemistry: Chem Dynamics & Quantum Mech/Lab* (5)	
CHE	441	Advanced Inorganic Chemistry (3)	
CHE	490	Research in Chemistry (3)	
SUBTOTAL			<hr style="width: 100%; border: 0.5px solid black;"/>
TOTAL			12 <hr style="width: 100%; border: 0.5px solid black;"/> 80-83

* Prerequisite: MAT177

** Prerequisite: CHE381/382

CHE426 may not be taken as an elective if CHE326 is taken.

ACS Certification in Biochemistry

Students are eligible to receive certification in the area of Biochemistry from the American Chemical Society (ACS) if the following course work is completed.

The following courses must be taken in the core requirements:

CHE	383/384	Physical Chemistry: Thermodynamics/Lab (substitutes for CHE340)	5
PHY	210/211	University Physics I/II	10

Where choices are available for major electives the following courses must be taken:

CHE	312/313	Organic II/Laboratory (5)	
*	CHE 381/382	Physical Chemistry: Chem Dynamics & Quantum Mech/Lab	(5)
**	CHE 426	Instrumental Methods (5)	
CHE	441	Advanced Inorganic Chemistry (3)	
MAT	177	Calculus with Analytical Geometry II (5)	

Major in Medical Technology

Missouri Western State University offers a program leading to the Bachelor of Science degree with a major in Medical Technology, also referred to as Clinical Laboratory Science. The first three years of the program are spent completing specified college course work (94 credits). The fourth year is spent in an affiliated hospital which provides a structured educational program in a clinical laboratory. The clinical training programs are accredited by the Committee on Allied Health Education and Accreditation of the American Medical Association through the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). When a student successfully completes the hospital clinical program, Missouri Western State University will award 30 credits for the fourth year's work.

Acceptance into a clinical laboratory program is highly competitive, and enrollment in the Medical Technology program does not guarantee acceptance of the student into a clinical program. Students must make separate application to one of the two affiliated hospitals for the clinical program, which consists of twelve months of full-time day clinical instruction. Affiliated programs are located at North Kansas City Hospital, St. Luke's Hospital of Kansas City, and University of Nebraska Medical Center In Omaha. Clinical course requirements and credit hours vary for each affiliated site. Students should consult the Medical Technology advisor in the Chemistry department for specific clinical course requirements and to ascertain the time schedule for application to each clinical program and the approximate dates when acceptance notices will be given.

Upon completion of the clinical program, students are eligible to take a national credentialing examination. Passing the examination is not a requirement for the Bachelor of Science degree with a major in Medical Technology; however, the student must pass the examination to become certified to practice as a medical technologist.

Requirements

			<i>Credits</i>
CHE	111	General Chemistry	5
CHE	120	General Chemistry II with Qualitative Analysis	5
CHE	310	Organic Chemistry I	3
CHE	311	Organic Chemistry Laboratory I	2
CHE	321	Quantitative Analysis	4
CHE	326	Instrumental Analysis	4
CHE	370	Biochemistry I	4
BIO	106	Principles of Cell Biology	4
BIO	205	Genetics	4
BIO	311	Animal Physiology	4

BIO	390	Microbiology	4
BIO	421	Immunology	4
MAT	116	College Algebra	3
TOTAL NATURAL SCIENCES AND MATHEMATICS			11

Courses in medical technology must total 30-43 credits.

MTE	412	Clinical Lab Science Theory, Applications and Correlation (5)	
MTE	413	Applications of Chemistry for Clinical Lab Science (1)	
MTE	420	Clinical Laboratory Management I (2)	
MTE	421	Clinical Laboratory Management II (3)	
MTE	430	Clinical Microbiology (5-8)	
MTE	432	Clinical Chemistry (6-10)	
MTE	434	Clinical Hematology (4-7)	
MTE	436	Clinical Immunohematology (3-7)	
MTE	438	Clinical Immunology (1-6)	
MTE	440	Clinical Urinalysis (1-3)	
MTE	442	Topics in Medical Technology (1-4)	
TOTAL MEDICAL TECHNOLOGY			30-43
TOTAL			80-93

* The courses and credit hours required will vary based on clinical site.

MINOR IN CHEMISTRY

Requirements			Credits
CHE	111	General Chemistry	5
CHE	120	General Chemistry II with Qualitative Analysis	5
CHE	310	Organic Chemistry I	3
CHE	311	Organic Chemistry Laboratory I	2
CHE	321	Quantitative Analysis	4
CHE	326	Instrumental Analysis	4
TOTAL			23

Semester Designation

- F -- the course is offered in the fall semester
- Sp -- the course is offered in the spring semester
- Su -- the course is offered in the summer semester
- DD -- the course is offered at the discretion of the department

CHEMISTRY COURSES

Waiving of any course prerequisites requires prior departmental authorization.

Laboratory fees are required for all lab courses. See the current course listings for fees. The student must furnish required laboratory apron and safety goggles in laboratory courses.

CHE 101 Introductory Chemistry (4) F, Sp, Su. Chemistry for liberal arts and sciences students; meets the minimum physical science requirement. Three hours lecture, two hours lab.

CHE 104 Fundamentals of Chemistry (5) F, Sp, Su. A survey of chemistry with special emphasis on solution and biochemistry; for students majoring in scientific and technological fields such as nursing or agriculture. Four hours lecture, two hours lab.

CHE 111 General Chemistry (5) F, Sp. 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: Math ACT of 20 or higher or the equivalent.

CHE 120 General Chemistry II with Qualitative Analysis (5) F, Sp. Continuation of CHE111. 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. Prerequisites: A grade of C or better in CHE111 and MAT116 or equivalent.

CHE 167 Chemical Applications of Calculus (1) F, Sp. Applications of differentiation, integration, and logarithmic and exponential functions to chemical processes. The initial focus will be in chemical dynamics and more specifically on chemical kinetics. Applications using maxima, minima and inflections will be used for equilibrium systems. Prerequisite: Credit or concurrent enrollment in MAT167.

CHE 283 Introduction to Research Methods in Chemistry (1-3) F, Sp, Su. Introduction to basic research in chemistry. Individual and team projects involving methods for solving chemistry-related research problems. May be repeated for credit. Prerequisite: High school chemistry, freshman or sophomore standing, and departmental approval.

CHE 295 Colloquium in Chemistry (1) Sp. An introduction to careers in chemistry and chemistry related fields. Breadth of career paths and educational requirements for those paths will be emphasized. Prerequisite: Freshman or sophomore standing, or departmental approval.

CHE 308 History and Philosophy of the Natural Sciences (3) Sp. A study of the history of the natural sciences with an emphasis on the philosophical analysis of these events. Prerequisites: Completion of General Studies Mathematics and Natural Sciences requirements.

CHE 310 Organic Chemistry I (3) F, Sp. 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: A grade of C or better in CHE120.

CHE 311 Organic Chemistry Laboratory I (2) F, Sp. Laboratory course to accompany CHE310 Organic Chemistry I lecture.. Six hours lab. Prerequisite: Credit or concurrent enrollment in CHE310.

CHE312 Organic Chemistry II (3) F, Sp. 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. Prerequisites: A grade of C or better in CHE310 and CHE311.

CHE 313 Organic Chemistry Laboratory II (2) F, Sp. Laboratory course to accompany CHE312. Six hours lab. Prerequisite: Credit or concurrent enrollment in CHE312.

CHE 321 Quantitative Analysis (4) F. Analytical chemistry; gravimetric, volumetric, colorimetric, and electroanalytical determinations. Two hours lecture, six hours lab. Prerequisite: A grade of C or better in CHE120. LAS Computer Literacy.

CHE 326 Instrumental Analysis (4) Sp. Theories and methods in modern instrumental analysis. Three hours lecture, three hours lab. Prerequisites: A grade of C or better in CHE310, CHE311, and CHE321.

CHE 340 Physical Chemistry for the Biological Sciences (4) F. Introduction for students of the biological sciences to the area of physical chemistry, a non-calculus based approach to the use of thermodynamics, equilibria, electrochemistry, kinetics, quantum mechanics, and spectroscopy as applied to the field of biochemistry. Three hours lecture, three hours lab. Prerequisites: A grade of C or better in CHE310, CHE311, PHY110, and MAT167.

CHE 370 Biochemistry I (4) F, Sp (odd-numbered years). Chemistry of biological compounds, metabolism, and biochemical genetics. Three hours lecture, three hours lab. Prerequisites: A grade of C or better in CHE310 and CHE311.

CHE 380 Environmental Chemistry (3) Sp (even-numbered years). 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. This course will provide background for understanding the demands of the chemical industrial workplace or for advanced study of these topics. Prerequisites: A grade of C or better in CHE310 and CHE311.

CHE 381 Physical Chemistry: Chemical Dynamics and Quantum Mechanics (3) F. Kinetic theory of gases, chemical kinetics, introduction to quantum chemistry, absorption and emission spectroscopy, bonding and conductivity. Three hours lecture. Prerequisites: MAT177, credit or concurrent enrollment in PHY210, and a grade of C or better in CHE310 and CHE311. LAS Computer Literacy.

CHE 382 Physical Chemistry Laboratory: Chemical Dynamics and Quantum Mechanics (2) F. Laboratory course to accompany CHE 381 Physical Chemistry: Chemical Dynamics and Quantum Mechanics lecture. Six hours lab. Prerequisite: Credit or concurrent enrollment in CHE381. LAS Computer Literacy.

CHE 383 Physical Chemistry: Thermodynamics (3) Sp. Thermodynamics, chemical equilibrium, properties of solutions, phase equilibria and electrochemistry. Prerequisites: MAT177, a grade of C or better in both CHE310 and CHE311, and credit or concurrent enrollment in PHY210.

CHE 384 Physical Chemistry Laboratory: Thermodynamics (2) Sp. Laboratory course to accompany CHE383 Physical Chemistry: Thermodynamics lecture. Six hours lab. Prerequisite: Credit or concurrent enrollment in CHE383.

CHE 426 Instrumental Methods (5) Sp. Modern methods of chemical instrumentation; includes both practical application; and fundamental theories of instrumental analyses. Three hours lecture, Six hours lab. Prerequisites: CHE321, CHE381, and CHE382.

CHE 441 Advanced Inorganic Chemistry (3) F (even-numbered years). 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. Prerequisites: CHE310 and CHE311.

CHE 442 Inorganic Synthesis (2) F (even-numbered years). 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. Six hours lab. Prerequisites: CHE310, CHE311, and credit or concurrent enrollment in CHE441.

CHE 445 Advanced Topics in Chemistry (3) Sp. 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. Prerequisites: CHE312, CHE381, and CHE382.

CHE 450 Independent Research/Project (1-5) F, Sp, Su. Investigation of a research problem, project, or topic on an individual conference basis. May be repeated for credit. Prerequisites: Declared Chemistry major, a minimum of 2.5 GPA in major field, and departmental approval.

CHE 465 Chemistry Teaching: Methods and Techniques (3) Sp (odd-numbered years). 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: CHE310 or departmental approval.

CHE 470 Biochemistry II (3) Su (even-numbered years). Advanced study of the biochemical properties of living systems, the diversity of biochemical functions, and mechanisms for biosynthesis. Three hours lecture. Prerequisites: A grade of C or better in CHE321 and CHE370.

CHE 490 Research in Chemistry (1-3) F, Sp, Su. Original research on problems in various fields of chemistry. Hours arranged. May be repeated for credit. Prerequisites: CHE381 and CHE382, or consent of department chairperson.

CHE 495 Seminar in Chemistry (2) F. Individual reports and group discussion on modern topics in chemistry. Prerequisites: Senior standing and COM104. LAS Writing.

MEDICAL TECHNOLOGY COURSES

The following courses are taken by fourth-year students enrolled in the clinical laboratory program as a part of the requirements for the degree in Medical Technology. These courses are not offered on the Missouri Western State University campus; they are provided in a twelve-month internship program in a hospital affiliated with Missouri Western State University and approved by the Society of Clinical Pathologists.

MTE 412 Clinical Lab Science Theory, Applications and Correlation (5). 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.

MTE 413 Applications of Chemistry for Clinical Lab Science (1). 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 therapeutic drug monitoring is emphasized.

MTE 420 Clinical Laboratory Management I (2). This course includes the theory, practical application and evaluation of laboratory management principles and associated models in healthcare and laboratory information systems, research, educational methodology, quality control, ethics, laboratory operations and scope of practice. Opportunities for building critical thinking, problem-solving, teamwork, communication, professionalism, research, management and leadership skills are provided.

MTE 421 Clinical Laboratory Management II (3). This course is a continuation of Clinical Laboratory Management I, and includes the theory, practical application and evaluation of laboratory management principles and associated models in compliance and regulatory issues, human resource management, written and oral communication, method evaluation, educational methodology, professionalism, test utilization, quality and financial resources. Opportunities for building critical thinking, problem-solving, communication, teamwork, professionalism, management and leadership skills are provided.

MTE 430 Clinical Microbiology (5-8). 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.

MTE 432 Clinical Chemistry (6-10). 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.

MTE 434 Clinical Hematology (4-7). 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.

MTE 436 Clinical Immunohematology (3-7). 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.

MTE 438 Clinical Immunology (1-6). 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.

MTE 440 Clinical Urinalysis (1-3). 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.

MTE 442 Topics in Medical Technology (1-4). 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.