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.

CHE 104 Fundamentals of Chemistry Credits: 5
Typically Offered: Fall, Spring.
Course Description: A survey of chemistry with special emphasis on solution and biochemistry; for students majoring in scientific and technological fields such as nursing. Four hours lecture, two hours lab.

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): Mat ACT of 22 or higher or a score of 70 or higher on the MWSU Math Placement Exam or the equivalent.

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 123 Quantitative Analysis Credits: 2
Typically Offered: Fall, Spring.
Course Description: 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(s): Credit or concurrent enrollment in MAT 167.

CHE 150 Organic Chemistry Laboratory I Credits: 2
Typically Offered: Fall, Spring.
Course Description: Laboratory course to accompany CHE 311, Organic Chemistry I lecture. Six hours lab. Prerequisite(s): Credit or concurrent enrollment in CHE 310.

CHE 167 Chemical Applications of Calculus Credits: 1
Typically Offered: Departmental Discretion.
Course Description: 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(s): Credit or concurrent enrollment in MAT 167.

CHE 167 Chemical Applications of Calculus Credits: 1
Typically Offered: Departmental Discretion.
Course Description: 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(s): Credit or concurrent enrollment in MAT 167.

CHE 283 Introduction to Research Methods in Chemistry Credits: 1-3
Typically Offered: Fall, Spring, Summer.
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 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. LAS Computer Literacy. 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 Physical Chemistry for the Biological Sciences  Credits: 4
Typically Offered: Spring.
Course Description: 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. Prerequisite(s): A grade of C or higher in CHE 310, CHE 311, CHE 321, PHY 110, and either MAT 166 or 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.
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 381 Physical Chemistry: Chemical Dynamics and Quantum Mechanics  Credits: 3
Typically Offered: Fall.
Course Description: Introduction to quantum chemistry, spectroscopy, bonding and statistical thermodynamics. Three hours lecture. CHE 321 recommended. LAS Computer Literacy. Prerequisite(s): MAT 177, PHY 210, and a grade of C or higher in CHE 310 and CHE 311.

CHE 382 Physical Chemistry Laboratory: Chemical Dynamics and Quantum Mechanics  Credits: 1
Typically Offered: Fall.
Course Description: Laboratory course to accompany CHE 381 Physical Chemistry: Quantum Mechanics lecture. Three hours lab. LAS Computer Literacy. Prerequisite(s): Credit or concurrent enrollment in CHE 381.

CHE 383 Physical Chemistry: Thermodynamics and Kinetics  Credits: 3
Typically Offered: Spring.
Course Description: Thermodynamics, chemical equilibrium, properties of solutions, electrochemistry, kinetic theory of gases, and chemical kinetics. Prerequisite(s): MAT 177, PHY 210, and a grade of C or higher in both CHE 310 and CHE 311. CHE 321 recommended.

CHE 384 Physical Chemistry Laboratory: Thermodynamics and Kinetics  Credits: 2
Typically Offered: Spring.
Course Description: Laboratory course to accompany CHE 383 Physical Chemistry: Thermodynamics and Kinetics lecture. Six hours lab. Prerequisite(s): Credit or concurrent enrollment in CHE 383.

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, CHE 381, and CHE 382.

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: Spring (even-numbered years).
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: Spring (odd-numbered years).
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, CHE 381, and CHE 382.

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): Declared Chemistry major, a minimum of 2.5 GPA in major field, and departmental approval.

CHE 465 Chemistry Teaching: Methods and Techniques  Credits: 3
Typically Offered: Spring (odd-numbered years).
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.
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 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.

CHE 495 Seminar in Chemistry  Credits: 2
Typically Offered: Fall.
Course Description: Individual reports and group discussion on modern topics in chemistry. LAS Writing. Prerequisite(s): Senior standing and COM 104.