CHEM 090  Introduction to Chemistry  3 Credit Hours
An introductory course in chemistry stressing fundamental principles of chemistry and the application of mathematics to chemistry and problem-solving. Topics will include chemical formulas and equations, stoichiometry, descriptive inorganic chemistry, behavior of gases and atomic structure. Students with high school chemistry and three years of high school mathematics should elect CHEM 114. Three hours lecture. (F).

CHEM 091  Introduction to Chemistry II  3 Credit Hours
The course is designed for the Chemistry 134/144 student whose background in chemistry is inadequate for success in 134/144. This course will be offered concurrently with Chem 090 (Introduction to Chemistry). It will begin after the first Chem 134/144 exam and will encompass the final nine weeks of the term. Topics will include chemical formulas and equations, stoichiometry, descriptive inorganic chemistry, behavior of gases, and atomic structure.

CHEM 100  Chemistry and Society  4 Credit Hours
An introductory course for nonscientists that examines the way chemistry impacts our world. The course will focus not only on what modern chemistry has accomplished, but more generally on the way scientists think and how they function. Selected topics include (a) air and water pollution, ozone layer, global warming, acid rain, and other environmental chemistry; (b) the chemistry of plastics and polymers; (c) the chemistry of drugs and medicines; and (d) biotechnology and genetic chemistry. Other topics include the influence of the media on scientific issues and the decision-making process in science. Three hours lecture, three hours lab. (YR).

CHEM 124  General Chemistry I  4 Credit Hours
An introduction to phenomena and principles of chemistry with emphasis on developing an understanding of the fundamentals of chemical processes. Concepts to be explored are chemical reactions, thermodynamics, equilibria, and kinetics. For students considering careers in life sciences, physical sciences and engineering. Three hours lecture, one hour recitation, three hours laboratory. Prerequisites are one year of high school chemistry and previous or concurrent enrollment in MATH 104 or 105. (F,W,S).
Prerequisite(s): MATH 104* or MATH 105* or Mathematics Placement with a score of 113
Corequisite(s): CHEM 124L

CHEM 124R  General Chemistry I Recitation  0 Credit Hours
Recitation component of CHEM 124L. Must be taken concurrently with CHEM 124.
Corequisite(s): CHEM 124

CHEM 134  General Chemistry IA  4 Credit Hours
An introduction to chemical phenomena and principles with an emphasis on developing both an understanding of chemistry and an appreciation of what chemists do. Students will investigate the fundamentals of chemistry in the context of real-world problems and will utilize systems of biological and environmental importance. Core concepts include stoichiometry, aqueous chemistry, gas laws, thermochemistry, atomic structure, molecular structure and bonding. Three hours lecture, one hour recitation, three hours laboratory. Primarily designed for students considering careers in life sciences or physical sciences. (F,W,S)
Prerequisite(s): MATH 104* or MATH 105* or MATH 113* or MATH 115* or Mathematics Placement with a score of 105 or Mathematics Placement with a score of 115

CHEM 136  General Chemistry IIA  4 Credit Hours
Continuation of CHEM 134. Concepts explored include conceptual and quantitative treatments of intermolecular forces, physical properties of solutions, chemical kinetics, chemical equilibria, acid-base equilibrium, thermodynamics, and electrochemistry. Primarily designed for students majoring in the physical sciences and the life sciences. (F,W,S)
Prerequisite(s): CHEM 134

CHEM 144  Gen Chemistry IB  4 Credit Hours
This course consists of an introduction to chemistry, its phenomena, and principles explored in the context of real-world examples (e.g. the automobile). Core concepts include states of matter, atomic and electronic structure, types of reactions (acid-base and reduction-oxidation), structure and bonding, gas laws, stoichiometry, thermodynamics, chemical equilibria, and the chemical composition of the atmosphere and air pollution problems. Three hour lecture, one hour recitation, three hours laboratory. Primarily designed for students considering careers in engineering. (F)
Prerequisite(s): MATH 105* or Mathematics Placement with a score of 113 or Mathematics Placement with a score of 115
Corequisite(s): CHEM 144L

CHEM 146  General Chemistry IIB  4 Credit Hours
Continuation of CHEM 144. This course consists of an introduction to chemistry, its phenomena, and principles explored in the context of real-world examples (e.g. the automobile). Core concepts to be explored include the solid state, chemical kinetics, electrochemistry and its applications (e.g. batteries, fuel cells, and corrosion), an introduction to organic functional groups, their reactions, and spectroscopic identification, and the preparation and properties of synthetic polymers. Primarily designed for students considering careers in engineering. (W)
Prerequisite(s): CHEM 144

CHEM 225  Organic Chemistry I  3 Credit Hours
The initial course in organic chemistry. A general introduction to organic chemistry with emphasis on the development of structure theory and functional group chemistry. Three hours lecture, one hour recitation. (F,S).
Prerequisite(s): CHEM 136 or CHEM 146
Corequisite(s): CHEM 225R

CHEM 225R  Organic Chemistry I Recitation  0 Credit Hours
Recitation component of CHEM 225. Must be taken concurrently with CHEM 225.
Corequisite(s): CHEM 225

CHEM 226  Organic Chemistry II  3 Credit Hours
A continuation of CHEM 225. Topics include functional group chemistry and properties of carbohydrates, amino acids, and aromatic compounds. Three hours lecture, one hour recitation. CHEM 225 and 226 constitute a two-semester sequence in organic chemistry, suitable for students in the basic sciences or engineering or with interests in one of the health professions. (W,S).
Prerequisite(s): CHEM 225
Corequisite(s): CHEM 226R

CHEM 226R  Organic Chemistry II Rec  0 Credit Hours
Recitation component of CHEM 226. Must be taken concurrently with CHEM 226.
Corequisite(s): CHEM 226

CHEM 227  Organic Chemistry Laboratory  2 Credit Hours
Development of the basic laboratory techniques of organic chemistry. The chemistry of functional groups is studied and various organic compounds are synthesized and purified. Eight hours laboratory. (F,W,S).
Prerequisite(s): CHEM 226*
CHEM 228  Org Chem Lab for Chem/Bchm  2 Credit Hours
CHEM 228 incorporates chemical reactions and techniques for the synthesis, purification, and characterization of organic molecules. Students will conduct modern organic chemical experiments, collect data using modern instrumentation, analyze that data, and explain their reasoning in written and visual formats. Students will learn techniques to conduct multi-step synthesis, isolation, and purification of organic molecules and use modern techniques for molecular structure elucidation and to analyze pure samples and mixtures. This course is aimed at students majoring in chemistry or biochemistry. Students cannot receive credit for both CHEM 227 and CHEM 228. (FW)
Prerequisite(s): (CHEM 134 and CHEM 136) or (CHEM 144 and CHEM 146) and CHEM 225 and CHEM 226*
Restriction(s):
Can enroll if Major is Chemistry (ACS Certified), Biochemistry

CHEM 344  Quantitative Analysis  4 Credit Hours
A survey of theory and practice of volumetric, gravimetric, electrometric and colorimetric analysis. Systematic analysis of complex materials. Two hours lecture, eight hours laboratory. (F).
Prerequisite(s): CHEM 136 or CHEM 146
Corequisite(s): CHEM 344L

CHEM 352  Introduction to Toxicology  3 Credit Hours
An introduction to the principles of toxicology with an emphasis on environmental toxicology. Major topics include toxic agents, toxicological mechanisms, and use of toxicological reference literature. Discussion of chemical carcinogenesis, genetic toxicology, immunotoxicology, teratology, and toxic responses of the skin, eyes and nervous system. Three hours lecture. (AY).
Prerequisite(s): CHEM 348* or ESCI 348*

CHEM 368  Physical Chemistry I  3 Credit Hours
Nature of the gaseous state, chemical thermodynamics, biochemical and chemical equilibria and kinetics. Three hours lecture, one hour discussion. (W).
Prerequisite(s): CHEM 225 and MATH 115 and (PHYS 125 or PHYS 150)

CHEM 370  Principles of Biochemistry  3 Credit Hours
A concise but comprehensive survey of various areas of biochemistry designed for non-biochemistry majors. The course follows the standard approach to the subject including a description of cells, their structure and constituent macromolecules (proteins, nucleic acids, carbohydrates and lipids), enzymology, bioenergetics, intermediary metabolism and gene regulation. Students cannot take both BCHM 370 and 470 or 471 for any combination of concentration, cognate or minor requirement. Three hours lecture. (F).
Prerequisite(s): BIOL 140 and CHEM 226

CHEM 390  Current Topics in Chemistry  1 to 3 Credit Hours
A course in special topics current to the field of chemistry. Topics and format for the course may vary. See current Schedule of Classes. One to three hours seminar. Permission of instructor. (OC).

CHEM 397  Current Topics in Chemistry  3 Credit Hours
A course for non-science majors which focuses on the interaction of chemistry and society. Sufficient chemical knowledge will be introduced so that the issues can be discussed and competing statements evaluated. Topics covered will include air and water pollution, fuels, designing drugs, etc. (OC).

CHEM 403  Inorganic Chemistry II  3 Credit Hours
A study of coordination and organometallic compounds through the use of current theories. The structure, reactivity, and descriptive chemistry of transition metal complexes will be examined. Three hours lecture. (W).
Prerequisite(s): CHEM 303 and (CHEM 368* or CHEM 468)
CHEM 426  Advanced Organic Chemistry  3 Credit Hours
Spectral analysis, structure determination, reaction mechanisms, 
synthesis, stereochemistry, and other selected topics are discussed. 
Three hours lecture. (AY).
Prerequisite(s): CHEM 226 and CHEM 227

CHEM 430  Bioinorganic Chemistry  3 Credit Hours
This course examines the roles that metals play in biological systems, 
including the chemical principles that make metal ions well-suited for 
roles in protein structure, in redox catalysis and in acid base chemistry. 
The physical and experimental techniques that are applied to explore the 
structure and function of metals in natural systems will be introduced 
using case studies from the primary scientific literature in the field.
Prerequisite(s): CHEM 136 and BIOL 140

CHEM 435  Green Chemistry  3 Credit Hours
An examination of green chemistry principles and methods used to 
assess and improve chemical processes with respect to environmental 
impact. Topics include: concepts of green chemistry, waste prevention, 
catalysis, renewable resources, alternative energy resources, and green 
technologies.
Prerequisite(s): CHEM 226 or CHEM 325
Restriction(s):
Cannot enroll if Class is Graduate

CHEM 436  Polymer Chemistry  3 Credit Hours
The macromolecular concept is introduced and polymerization 
mechanisms are discussed. The chemistry and physical properties 
of representative polymeric materials are presented. Topics include 
the determination and distribution of molecular weights, polymer 
morphology, mechanical properties of polymers, relaxation phenomena in 
polymers, and methods of polymer characterization. Three hours lecture. 
(AY).
Prerequisite(s): CHEM 226 and (CHEM 368* or CHEM 468)

CHEM 437  Nano-Biotechnology  3 Credit Hours
An introduction to the fundamentals of nanotechnology, nano-fabrication 
processes and its application in different fields with special attention 
to the life sciences. This course introduces different tools used in 
nanotechnology and investigates how one can borrow the idea of self-assembly from nature to design structures at the nanometer scale. The 
course also focuses on different contemporary application areas of 
nanotechnology like biosensor development, cancer research and drug 
delivery. The research areas of selected companies that are applying nanotechnology to develop new products will also be explored. This 
course showcases the interchange of ideas between chemistry, materials 
science and engineering in solving complex biological problems.
Prerequisite(s): (CHEM 136 or CHEM 146) and (PHYS 126 or PHYS 151) 
and BIOL 140
Restriction(s):
Can enroll if Class is Junior or Senior

CHEM 447  Instrumental Methods of Analysis  4 Credit Hours
A study of the theory, operation, and application of instrumental methods 
of chemical analysis including optical, magnetic, electrochemical, and 
separation techniques. Two hours lecture, eight hours laboratory. (W).
Prerequisite(s): CHEM 368* or CHEM 468

CHEM 450  Adv Org Syn & Character Lab  1 Credit Hour
Concepts and techniques from previous laboratory courses as well as 
advanced techniques are applied to synthesis and characterization of 
organic compounds. Spectroscopic and chromatographic data collection 
and interpretation are critical to success in the course. Formal writing 
and data presentation is emphasized. Oral presentation and a poster 
presentation is required. Crossover experiments with CHEM 452 are likely. 
Four hours laboratory (W).
Prerequisite(s): CHEM 227 and CHEM 226 and CHEM 447 and CHEM 468 
Corequisite(s): CHEM 452

CHEM 452  Adv Inorg Synth & Char Lab  1 Credit Hour
Concepts and techniques from previous laboratory courses as well as 
advanced techniques are applied to the synthesis and characterization of 
inorganic compounds. The ability to collect and interpret spectroscopic 
data is an important aspect of the course. Technical writing and data 
presentation is emphasized. Oral presentation and a poster presentation 
is required. Crossover experiments with CHEM 450 are likely. Four hours 
laboratory. (W)
Prerequisite(s): CHEM 226 and CHEM 227 and CHEM 136 and CHEM 403 
and CHEM 447 and CHEM 481
Corequisite(s): CHEM 450

CHEM 469  Physical Chemistry II  3 Credit Hours
Nature of the liquid state, simple mixtures, heterogeneous equilibria; 
quantum theory, atomic and molecular structure, spectroscopy; 
statistical thermodynamics. Three hours lecture, one hour discussion. (F).
Prerequisite(s): CHEM 368

CHEM 470  Biochemistry I  3 Credit Hours
Life processes from a chemical viewpoint: structure/function 
relationships of biomolecules, with emphasis on proteins, enzyme 
kinetics, and mechanisms of action. Three hours lecture. (W).
Prerequisite(s): (BIOL 130 and BIOL 140 and CHEM 134) or (CHEM 144 
and CHEM 136) or (CHEM 146 and CHEM 225)

CHEM 471  Biochemistry II  3 Credit Hours
Intermediary metabolism, bioenergetics, energy transformation, 
metabolic interrelationships, biochemical regulation, highly structured 
subcellular biochemical systems. Three hours lecture. (W).
Prerequisite(s): BCHM 470 or CHEM 470 or BIOL 470

CHEM 472  Biochemistry Laboratory I  1 Credit Hour
The techniques of preparative and analytical biochemistry. Preparation 
and characterization of proteins and nucleic acids. Physical and 
chemical properties of proteins and nucleic acids. Four hours laboratory. 
CHEM 344 Recommended. (F).
Prerequisite(s): (BIOL 470* or BCHM 470* or CHEM 470*) and CHEM 227

CHEM 473  Biochemistry Laboratory II  1 Credit Hour
The techniques of preparative and analytical biochemistry. Preparation 
and characterization of lipids and carbohydrates. Methods in 
metabolism. Four hours laboratory. (W).
Prerequisite(s): (BCHM 471* or BIOL 471* or CHEM 471*) and 
(BCHM 472* or BIOL 472* or CHEM 472*)

CHEM 481  Physicochemical Measurements  2 Credit Hours
Laboratory work including the determination of molecular weights, 
measurements of properties of pure liquids and solutions, studies of 
phase equilibria, thermochemical measurements, and analysis of atomic 
and molecular spectra. Eight hours laboratory. (W).
Prerequisite(s): CHEM 469*
CHEM 490  Topics in Chemistry     1 to 3 Credit Hours
Examination of problems and issues in selected areas of chemistry. Title as listed in Schedule of Classes will change according to content. Course may be repeated for credit when specific topics differ. One to three hours lecture. (YR).
Prerequisite(s): CHEM 226
Restriction(s):
Can enroll if Class is Junior or Senior or Graduate

CHEM 490D  Topics in Chemistry     3 Credit Hours
Topic: Bioinorganic Chemistry. Introduces the roles metals play in biological systems. Explores chemical principles that make metals particularly well suited for these roles. Introduces physical and experimental techniques used to explore the structure and function of metals in natural systems. Explores case studies from the literature to synthesize results of various experiments to develop a final understanding of the systems. Students will not receive credit for both CHEM 490D and 590B.
Prerequisite(s): CHEM 226 and BIOL 140

CHEM 493  Chemistry Capstone Portfolio     1 Credit Hour
Employment or graduate studies in chemistry involve integration of experiences and knowledge from one's undergraduate courses. This course is designed to help prepare students for their professional endeavors beyond UM-Dearborn. Students will submit a proposal for a senior project, present the completed project in an appropriate forum, and submit a written report on the project. Students will assemble and present a professional portfolio, and complete an exit interview. The experimental work on the project may be done in an advanced laboratory course or an independent study. (F, W).
Restriction(s):
Can enroll if Class is Senior

CHEM 495  Off-Campus Research Participat     1 to 3 Credit Hours
Participation in ongoing experimental research at an off-campus laboratory. Arrangements made between the research laboratory, the student and the chemistry concentration advisor. No more than six hours combined from CHEM 495, 498, and 499 may be credited toward the 120 hours required for a degree. Four to twelve hours laboratory. Permission of concentration advisor. (F, W, S).

CHEM 497  Seminar in Chemistry     1 Credit Hour
Weekly seminars on topics of current chemical interest presented by faculty members, guest lecturers or students. The subject will vary from term to term. The course may be elected up to three times. One hour seminar. (W).
Restriction(s):
Can enroll if Class is Junior or Senior or Graduate
Cannot enroll if Major is Chemistry (Instructional), Chemistry (ACS Certified)

CHEM 498  Readings in Chemistry     1 to 3 Credit Hours
Library research in a specific area of chemistry performed under the guidance of a faculty member. No more than six hours combined from CHEM 495, 498 and 499 may be credited toward the 120 hours required for a degree. Four to twelve hours of readings. Permission of instructor. (F, W, S).

CHEM 499  Laboratory Research in Chem     1 to 3 Credit Hours
Directed laboratory research performed under the guidance of a faculty member. No more than six hours combined from CHEM 495, 498 and 499 may be credited towards the 120 hours required for a degree. Four to twelve hours laboratory. Permission of instructor. (F, W, S).