Chemistry (CHEM)

Courses

CHEM A054 Chemistry Skills and Problem Solving 3 Credits
A preparatory chemistry course for students without high school chemistry or with limited mathematics background. Develops foundational problem-solving skills using basic models of chemistry. CHEM A054 is the preparatory course for CHEM A103 and CHEM A105.

Prerequisites: MATH A105 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or ALEKS Overall Test 1 with a score of 055 or ALEKS Overall Test 2 with a score of 055 or ALEKS Overall Test 3 with a score of 055 or ALEKS Overall Test 4 with a score of 055 or ALEKS Overall Test 5 with a score of 055.

CHEM A055 Contemporary Chemistry 3 Credits
Introductory course for students with little or no chemistry background. Covers units of measurement, matter, atoms, periodic table, nomenclature, equations, oxidation-reduction, solutions, calculations, and problem solving.

Prerequisites: MATH A055 with a minimum grade of C or MATH A105 with a minimum grade of C or MATH A151 with a minimum grade of C.

CHEM A103 Introduction to General Chemistry 3 Credits
Introductory chemistry survey course for health science majors and preparatory course for science majors. Topics include: measurement, energy and matter, periodic trends, chemical composition, chemical reactions, solutions, bond theory, phases, oxidation-reduction, nuclear chemistry, problem-solving (applied mathematics), and special topics.

Prerequisites: CHEM A054 with a minimum grade of P or CHEM A055 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A251 with a minimum grade of C or ALEKS Overall Test 1 with a score of 065 or ALEKS Overall Test 2 with a score of 065 or ALEKS Overall Test 3 with a score of 065 or ALEKS Overall Test 4 with a score of 065 or ALEKS Overall Test 5 with a score of 065.

Attributes: UAA Natural Sciences GER.

CHEM A103L Introduction to General Chemistry Laboratory 1 Credit
Introductory chemistry laboratory course with experiments designed to introduce students to the basics of laboratory equipment, experimental methodology, data collection, data analysis and reporting. This course illustrates, augments and applies concepts covered in CHEM A103.

Special Note: Students who do not meet the prerequisites for this course may be administratively dropped at the discretion of the faculty. Attendance is mandatory for all chemistry laboratory courses the first week of class. Unless prior arrangements are made with the instructor, any student who does not attend the first scheduled meeting for this lab may be administratively dropped and a student on a waiting list will be added in their place. Any fees resulting from either of these drop procedures or any late registration procedure will be the responsibility of the student.

Prerequisites: CHEM A103 with a minimum grade of C or concurrent enrollment.

Attributes: UAA Natural Sci Lab Only GER.

CHEM A104 Introduction to Organic and Biochemistry 3 Credits
This is the second semester course in the sequence for health science majors and comprises a survey of the fundamentals of chemistry as applied to biological systems. Topics include: nomenclature of organic compounds, organic functional groups and reactions, biochemical processes and pathways, biological macromolecules, and metabolites.

Special Note: CHEM A104L is the lab component of this course and requires a separate registration.

Prerequisites: CHEM A103 with a minimum grade of C or CHEM A105 with a minimum grade of C.

Attributes: UAA Natural Sciences GER.

CHEM A104L Introduction to Organic and Biochemistry Laboratory 1 Credit
Second semester introductory chemistry laboratory course with experiments designed to reinforce concepts, including the basics of laboratory equipment, experimental methodology, data collection, data analysis and reporting. This course illustrates, augments and applies concepts covered in CHEM A104.

Special Note: Students who do not meet the prerequisites for this course may be administratively dropped at the discretion of the faculty. Attendance is mandatory for all chemistry laboratory courses the first week of class. Unless prior arrangements are made with the instructor, any student who does not attend the first scheduled meeting for this lab may be administratively dropped and a student on a waiting list will be added in their place. Any fees resulting from either of these drop procedures or any late registration procedure will be the responsibility of the student. Pregnant students should be aware that they will be using chemicals in this course that are teratogenic and may cause harm to unborn children.

Prerequisites: CHEM A103L with a minimum grade of C and CHEM A104 with a minimum grade of C or concurrent enrollment.

Attributes: UAA Natural Sci Lab Only GER.
CHEM A105 General Chemistry I 3 Credits
Introduces general chemistry and explores topics to a much greater depth than preparatory courses. Topics include: measurement, energy and matter, periodic trends, chemical composition, chemical reactions, solutions, bond theory, gases, thermodynamics, problem-solving (applied mathematics) and special topics.
Special Note: Assumes prior knowledge of algebra and high school chemistry. CHEM A105L is the lab component of this course and requires a separate registration.
Prerequisites: CHEM A054 with a minimum grade of P or CHEM A055 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A251 with a minimum grade of C or ALEKS Overall Test 1 with a score of 065 or ALEKS Overall Test 2 with a score of 065 or ALEKS Overall Test 3 with a score of 065 or ALEKS Overall Test 4 with a score of 065 or ALEKS Overall Test 5 with a score of 065.
Attributes: UAA Natural Sciences GER.

CHEM A105L General Chemistry I Laboratory 1 Credit
Introductory chemistry laboratory course with experiments designed to introduce students to the basics of laboratory equipment, experimental methodology, data collection, data analysis and reporting. This course illustrates, augments and applies concepts covered in CHEM A105.
Special Note: Students who do not meet the prerequisites for this course may be administratively dropped at the discretion of the faculty. Attendance is mandatory for all chemistry laboratory courses the first week of class. Unless prior arrangements are made with the instructor, any student who does not attend the first scheduled meeting for this lab may be administratively dropped and a student on a waiting list will be added in their place. Any fees resulting from either of these drop procedures or any late registration procedure will be the responsibility of the student.
Prerequisites: CHEM A105 with a minimum grade of C or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

CHEM A105R General Chemistry I Recitation 1 Credit
Provides direction and review of the concepts and calculations covered in General Chemistry I.
Corequisites: CHEM A105.

CHEM A106 General Chemistry II 3 Credits
The second semester in the general chemistry sequence. Topics include: kinetics, equilibrium chemistry (including acids and bases, solubility, and complex ion formation), nuclear chemistry, electrochemistry, thermodynamics and special topics.
Special Note: CHEM A106L is the laboratory component of this course and requires a separate registration.
Prerequisites: CHEM A105 with a minimum grade of C.
Attributes: UAA Natural Sciences GER.

CHEM A106L General Chemistry II Laboratory 1 Credit
Second semester introductory chemistry laboratory course with experiments designed to reinforce concepts, including the basics of laboratory equipment, experimental methodology, data collection, data analysis and reporting. This course illustrates, augments and applies concepts covered in CHEM A106.
Special Note: Students who do not meet the prerequisites for this course may be administratively dropped at the discretion of the faculty. Attendance is mandatory for all chemistry laboratory courses the first week of class. Unless prior arrangements are made with the instructor, any student who does not attend the first scheduled meeting for this lab may be administratively dropped and a student on a waiting list will be added in their place. Any fees resulting from either of these drop procedures or any late registration procedure will be the responsibility of the student.
Prerequisites: CHEM A105L with a minimum grade of C and CHEM A106 with a minimum grade of C or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

CHEM A106R General Chemistry II Recitation 1 Credit
Provides direction and review of the concepts and calculations covered in General Chemistry II.
Corequisites: CHEM A106.

CHEM A208 Principles of Bioinorganic Chemistry 3 Credits
Study of introductory inorganic chemistry concepts with a focus on biologically-active, organometallic compounds.
Prerequisites: CHEM A106 with a minimum grade of C.

CHEM A218 Experiential Learning: Quantitative Chemical Analysis 5 Credits
Introduces the foundational methods and theories associated with quantitative analysis of chemical substances. Learning activities present students with conceptual and chemical models followed by questions to guide them through the learning cycle of structured scientific evaluation of analytical data. Introduces the fundamentals of quantitative chemical analysis, including the basics of experimental design, analytical controls, statistical methods of data analysis, data presentation, and how to discriminate between sound and unsound data. Activities promote independent operations of solution preparation, titration, spectrophotometry and chromatography.
Special Note: Pregnant students should be aware that they will be using chemicals in this course that are teratogenic and may cause harm to unborn children.
Prerequisites: CHEM A106 with a minimum grade of C and CHEM A106L with a minimum grade of C.

CHEM A253 Principles of Inorganic Chemistry 3 Credits
Study of theoretical and practical aspects of chemical bonding, descriptive periodic trends, and molecular structure and symmetry of molecules. A special emphasis is given to the chemistry of the transition metals, including coordination and organometallic chemistry.
Prerequisites: CHEM A106 with a minimum grade of C.
CHEM A312 Quantitative Analysis 5 Credits
General principles of chemical analysis, including introduction to volumetric, gravimetric and instrumental methods, theory, problems, and laboratory.

Special Note: Pregnant students should be aware that they will be using chemicals in this course that are teratogenic and may cause harm to unborn children.

Prerequisites: CHEM A106 with a minimum grade of C and CHEM A106L with a minimum grade of C.

CHEM A321 Organic Chemistry I 3 Credits
Investigates the chemistry of carbon compounds including alkanes, alkenes, alkynes, alkyl halides, and arenes. Discusses physical properties, nomenclature, synthesis, reactions, reaction mechanisms, and stereochemistry of these compounds.

Prerequisites: CHEM A106 with a minimum grade of C.

CHEM A321R Organic Chemistry I Recitation 1 Credit
Provides direction and review of the concepts covered in Organic Chemistry I.

Corequisites: CHEM A321.

CHEM A322 Organic Chemistry II 3 Credits
Continuation of CHEM A321. Includes the study of spectroscopic properties, delocalized electron systems, aromatic reactions, carbonyl compound reactions and amines. Emphasizes nomenclature, physical properties, synthetic methods and reaction mechanisms.

Special Note: It is strongly recommended that students register in CHEM A322 within one year of completing CHEM A321.

Prerequisites: CHEM A321 with a minimum grade of C.

CHEM A322R Organic Chemistry II Recitation 1 Credit
Provides direction and review of the concepts covered in Organic Chemistry II.

Corequisites: CHEM A322.

CHEM A323L Organic Chemistry Laboratory 2 Credits
A practical implementation of the theory learned in CHEM A321 and A322. Purification techniques, spectroscopic methods and synthetic methods of organic compounds will be taught.

Special Note: It is strongly recommended that students who wish to co-register in CHEM A322 and CHEM A323L complete CHEM A321 with a minimum grade of B. Students who complete CHEM A321 with a grade of C are strongly recommended to pass CHEM A322 prior to registering in CHEM A323L. Students who do not meet the prerequisites for this course may be administratively dropped at the discretion of the faculty. Attendance is mandatory for all chemistry laboratory courses the first week of class. Unless prior arrangements are made with the instructor, any student who does not attend the first scheduled meeting for this lab may be administratively dropped and a student on a wait list will be added in their place. Any fees resulting from either of these drop procedures or any late registration procedure will be the responsibility of the student. Pregnant students should be aware that they will be using chemicals in this course that are teratogenic and may cause harm to unborn children.

Prerequisites: CHEM A106L with a minimum grade of C and CHEM A321 with a minimum grade of C and CHEM A322 with a minimum grade of C or concurrent enrollment.

CHEM A332 Physical Chemistry II 3 Credits
Principles of quantum mechanics with application to atomic and molecular structure and spectroscopy. Introduction to statistical mechanics.

Special Note: MATH A302 is strongly recommended.

Prerequisites: PHYS A303 with a minimum grade of C and MATH A314 with a minimum grade of C.

CHEM A411 Biophysical Chemistry 3 Credits
Study of principles of thermodynamics, equilibrium, and kinetics with a focus on biochemical systems.

May Be Stacked With: CHEM A611

Prerequisites: CHEM A106 with a minimum grade of C and MATH A251 with a minimum grade of C and PHYS A124 with a minimum grade of C.

CHEM A418 Experiential Learning: Chemical Instrumentation and Methods 5 Credits
An experiential learning course that includes discussion of theories and concepts, and extensive laboratory exercises in qualitative and quantitative analysis of chemical compounds, with applications to health sciences, biomedical sciences, environmental sciences and geosciences.

May Be Stacked With: CHEM A618

Prerequisites: CHEM A218 with a minimum grade of C and CHEM A321 with a minimum grade of C.

CHEM A434 Instrumental Methods 5 Credits
Techniques in operating new and specialized instruments for qualitative and quantitative analysis and analytical methods of an advanced nature. For students in chemistry and allied fields.

May Be Stacked With: CHEM A634

Prerequisites: CHEM A312 with a minimum grade of C.

CHEM A441 Principles of Biochemistry I 3 Credits
A study of the structure and function of various biomolecules, including amino acids, proteins, carbohydrates, nucleic acids, lipids and membranes.

Special Note: Students who complete CHEM A441 as part of their undergraduate degree cannot receive credit toward their graduate degree from CHEM A641.

May Be Stacked With: CHEM A641

Prerequisites: CHEM A218 with a minimum grade of C and CHEM A321 with a minimum grade of C.

Attributes: UAA Integrative Capstone GER.

CHEM A442 Principles of Biochemistry II 3 Credits
A study of the bioenergetics and the metabolic pathways of amino acids, proteins, carbohydrates, nucleic acids, lipids and membranes.

Special Note: Students who complete CHEM A442 as part of their undergraduate degree cannot receive credit toward their graduate degree from CHEM A642.

May Be Stacked With: CHEM A642

Prerequisites: CHEM A641 with a minimum grade of C.

CHEM A443 Biochemistry Laboratory 2 Credits
Provides instruction in modern biochemical laboratory techniques.

Prerequisites: CHEM A441 with a minimum grade of C.
CHEM A450 Environmental Chemistry 3 Credits
Examines the origin and evolution of the environment, energy, mineral resources, solid wastes, recycling, air and water pollution, and the effects of foreign substances on living systems. The relationships among these problems will be demonstrated and quantitative chemical principles applied.
Special Note: This course is an introduction to environmental chemistry for all science majors.
Registration Restrictions: Instructor approval
Prerequisites: CHEM A106 with a minimum grade of C.

CHEM A456 Nonlinear Dynamics and Chaos 3 Credits
An introduction to nonlinear dynamics and chaos. Concrete examples from physics, biology, chemistry, and engineering are used to develop analytical methods and geometric intuition. Topics covered include phase plane analysis, iterated maps, fractals, and strange attractors.
Registration Restrictions: Completion of GER Tier 1 (basic college-level skills) courses and junior standing.
Crosslisted With: BIOL A456 and PHYS A456
Prerequisites: MATH A253 with a minimum grade of C and (PHYS A124 with a minimum grade of C or PHYS A212 with a minimum grade of C).
Attributes: UAA Integrative Capstone GER.

CHEM A471 Immunology 3 Credits
Crosslisted With: BIOL A471.
Prerequisites: BIOL A242 with a minimum grade of C and BIOL A252 with a minimum grade of C.

CHEM A477 Bioanalytical Chemistry 5 Credits
Techniques in operating instrumentation and laboratory methods for the analysis of biomolecules.
Special Note: For students in biology, chemistry and allied fields.
May Be Stacked With: CHEM A677
Prerequisites: CHEM A312 with a minimum grade of C or CHEM A441 with a minimum grade of C.

CHEM A480 Molecular Spectroscopy and Structure 3 Credits
Introduction to determining constitutional and stereochemical structure of chemical compounds using spectroscopic methods (mass spectrometry, nuclear magnetic resonance, infrared, ultraviolet), with applications to health, biomedical and environmental sciences.
May Be Stacked With: CHEM A680
Prerequisites: CHEM A322 with a minimum grade of C.

CHEM A481 Experiential Learning: Undergraduate Seminar I 1 Credit
Introduction to the techniques and style of technical oral presentation generally accepted by professional chemists.
Registration Restrictions: Department approval

CHEM A482 Experiential Learning: Undergraduate Seminar II 2 Credits
Continuation of instruction on the techniques and style of technical oral presentation generally accepted by professional chemists.
Prerequisites: CHEM A481 with a minimum grade of C.

CHEM A490 Selected Lecture Topics in Chemistry 1-3 Credits
Detailed coverage of a selected lecture topic in chemistry presented at a breadth and depth appropriate for upper division undergraduate science studies. Activities will vary according to the topic. For students in chemistry and allied fields.
Special Note: May be repeated for a maximum of 12 credits with change of subtitle. Prerequisites and corequisites may vary with topic.
Registration Restrictions: Junior or senior standing and instructor approval
May Be Stacked With: CHEM A690

CHEM A492 Undergraduate Seminar 1 Credit
Topical subjects in chemistry and biochemistry presented by undergraduate students.
Special Note: May be repeated once for credit.
Registration Restrictions: Junior or senior standing and department chair permission.

CHEM A495 Chemistry Internship 3 Credits
Work experience in an approved position with supervision and training in various agencies and businesses. Exposes student to work environment beyond the campus setting to acquire essential practical skills and enhance self-confidence and career direction.
Special Note: May be repeated once for credit.
Registration Restrictions: Junior or senior standing and department chair approval.

CHEM A498 Individual Research 1-6 Credits
Discipline-specific research for undergraduate students. Topic of study to be approved and mentored by a faculty member.
Special Note: May be repeated for a maximum of 6 credits.
Registration Restrictions: Department approval

CHEM A611 Advanced Biophysical Chemistry 3 Credits
Advanced study of biophysical chemistry through the principles of thermodynamics, equilibrium and kinetics with a focus on biochemical systems. Introduction to computational techniques in physical chemistry. Examination of the current literature in biophysical chemistry.
Special Note: Not available for credit to students who have completed CHEM A411.
Registration Restrictions: Instructor permission and graduate standing
May Be Stacked With: CHEM A411
CHEM A618 Experiential Learning: Advanced Chemical Instrumentation and Methods 5 Credits
An advanced experiential learning course that includes discussion of theories and concepts, and extensive laboratory exercises in qualitative and quantitative analysis of chemical compounds, with applications to health sciences, biomedical sciences, environmental sciences and geosciences.
Special Note: Not available for credit to students who have completed CHEM A418.
Registration Restrictions: Graduate standing and instructor approval
May Be Stacked With: CHEM A418

CHEM A634 Advanced Instrumental Methods 5 Credits
Lectures are concurrent with CHEM A434. A study of techniques in operating new and specialized instruments for qualitative and quantitative analysis and analytical methods of an advanced nature. Topics are appropriate for students in chemistry and allied fields. Graduate students will be required to develop an instrumental method, to submit a research paper summarizing their findings, including designs for future experiments on the subject and to give a seminar on the topic.
Special Note: Not available for credit to students who have completed CHEM A434.
May Be Stacked With: CHEM A434
Prerequisites: CHEM A312 with a minimum grade of C.

CHEM A641 Advanced Biochemistry I 3 Credits
In depth study of the structure and function of various biomolecules, including amino acids, proteins, carbohydrates, nucleic acids, lipids and membranes.
Special Note: Not available for credit to students who have taken CHEM A441.
Registration Restrictions: Graduate standing; a course in organic chemistry and a course in biology, or instructor permission.
May Be Stacked With: CHEM A441

CHEM A642 Advanced Biochemistry II 3 Credits
In-depth study of the bioenergetics and the metabolic pathways of amino acids, proteins, carbohydrates, nucleic acids and lipids.
Special Note: Not available for credit to students who have taken CHEM A442.
Registration Restrictions: Graduate standing
May Be Stacked With: CHEM A442
Prerequisites: CHEM A641 with a minimum grade of B.

CHEM A677 Advanced Bioanalytical Chemistry 5 Credits
Advanced techniques in operating instrumentation and laboratory methods for the analysis of biomolecules. Graduate students will be required to develop a bioanalytical technique in the lab and give a seminar on their findings.
Special Note: Not available for credit to students who have completed CHEM A477.
Registration Restrictions: Graduate standing and instructor approval
May Be Stacked With: CHEM A477

CHEM A680 Advanced Molecular Spectroscopy and Structure 3 Credits
Advanced molecular spectroscopy theory and principles for structural analysis. Literature will be reviewed with regard to recent applications to health, biomedical and environmental sciences.
Special Note: Not available for credit to students who have completed CHEM A480.
Registration Restrictions: Graduate standing and instructor approval
May Be Stacked With: CHEM A480

CHEM A690 Advanced Lecture Topics in Chemistry 1-3 Credits
Advanced coverage of selected lecture topics in chemistry presented at a breadth and depth appropriate for graduate studies. Exposure to the topic will rely extensively on independent review of literature supplemented with text and lecture for references.
Special Note: May be repeated for a maximum of 12 credits with change in subtitle. Prerequisites and corequisites may vary with topic.
Registration Restrictions: Graduate standing
May Be Stacked With: CHEM A490

CHEM A698 Graduate Research 1-6 Credits
Discipline-specific research for graduate students. Topic of study to be approved and directed by a faculty member.
Special Note: May be repeated for a maximum of 12 credits.
Registration Restrictions: Graduate standing and permission of graduate advisor

CHEM A699 Graduate Thesis 1-6 Credits
Development, preparation, and completion of thesis at a graduate level. May be repeated for a maximum of 6 credits.
Registration Restrictions: Graduate standing and instructor permission.