

# CHEMISTRY (CHEM)

## CHEM 1106 Chemistry for Allied Health Sciences Laboratory 1 Credit

**Department:** College of Arts and Sciences

Laboratory to accompany a survey of elementary inorganic/organic chemistry and gas laws for allied health science majors. Designed for students majoring in health sciences.

**Prerequisite(s):** MATH 1314 or MATH 2311 or MATH 2312 or MATH 2413

**Corequisite(s):** CHEM 1306

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1108 Biochemistry for Allied Health Sciences Laboratory 1 Credit

**Department:** College of Arts and Sciences

Laboratory to accompany an elementary survey of structure, function and metabolic processes of molecules in organisms. Designed for students majoring in health sciences. Corequisite: CHEM 1308. Prerequisites:

CHEM 1306, CHEM 1106. Offered: Summer

**Prerequisite(s):** CHEM 1306 and CHEM 1106

**Corequisite(s):** CHEM 1308

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1111 General Chemistry I Laboratory 1 Credit

**Department:** College of Arts and Sciences

Laboratory to accompany an algebra based review of chemical laws and theory for science, engineering and preprofessional majors.

**Prerequisite(s):** MATH 1314 or MATH 2312 or MATH 2311 or MATH 2413

**Corequisite(s):** CHEM 1311

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1112 General Chemistry II Laboratory 1 Credit

**Department:** College of Arts and Sciences

Laboratory to accompany CHEM 1312: theories of solutions, equilibrium, thermodynamics and kinetics.

**Prerequisite(s):** CHEM 1311 and CHEM 1111

**Corequisite(s):** CHEM 1312

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1171 Supplemental Lab 1 Credit

**Department:** College of Arts and Sciences

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1306 Chemistry for Allied Health Sciences 3 Credits

**Department:** College of Arts and Sciences

Survey of elementary inorganic/organic chemistry and gas laws for allied health science majors.

**Prerequisite(s):** MATH 1314

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1308 Biochemistry for Allied Health Sciences 3 Credits

**Department:** College of Arts and Sciences

Elementary survey of structure, function and metabolic processes of molecules in organisms. Designed for students majoring in health sciences.

**Prerequisite(s):** CHEM 1306 and CHEM 1106

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1311 General Chemistry I 3 Credits

**Department:** College of Arts and Sciences

Algebra-based review of chemical laws and theory for science, engineering and preprofessional majors.

**Prerequisite(s):** MATH 1314 or MATH 2312 or MATH 2413 or MATH 2311

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 1312 General Chemistry II 3 Credits

**Department:** College of Arts and Sciences

A continuation of CHEM 1311. Theories of solutions, equilibrium, thermodynamics and kinetics.

**Prerequisite(s):** (CHEM 1311 and CHEM 1111) or CHEM 1411

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 2411 Integrated Sciences 4 Credits

**Department:** College of Arts and Sciences

An integrated approach to understanding the fundamentals of energy, electromagnetic radiation, atomic structure and chemical bonding. Applications of these principles in living systems, environmental science and technology will be emphasized. This course is part of a four course science sequence designed to provide students a basic understanding of the concepts and methodologies employed throughout the fields of science.

**Prerequisite(s):** MATH 1314

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 3111 Organic Chemistry I Laboratory 1 Credit

**Department:** College of Arts and Sciences

Laboratory to accompany a course on current theories and chemical principles as they relate to the field of structure and reaction of the various types of organic compounds.

**Prerequisite(s):** CHEM 1412 or (CHEM 1312 and CHEM 1112)

**Corequisite(s):** CHEM 3311

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

## CHEM 3112 Organic Chemistry II Laboratory 1 Credit

**Department:** College of Arts and Sciences

Laboratory to accompany CHEM 3312, a continuation of CHEM 3111.

**Prerequisite(s):** CHEM 3411 or (CHEM 3311 and CHEM 3111)

**Corequisite(s):** CHEM 3312

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 3131 Inorganic Chemistry I Laboratory 1 Credit****Department:** College of Arts and Sciences

A laboratory to accompany CHEM 3331 Inorganic Chemistry. This laboratory is designed for chemistry majors to introduce synthesis, purification and analysis of inorganic compounds.

**Prerequisite(s):** CHEM 1412 or (CHEM 1312 and CHEM 1112) and CHEM 3331**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 3311 Organic Chemistry I 3 Credits****Department:** College of Arts and Sciences

Current theories and chemical principles as they relate to the field of structure and reaction of the various types of organic compounds.

**Prerequisite(s):** CHEM 1412 or (CHEM 1312 and CHEM 1112)**Corequisite(s):** CHEM 3111**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 3312 Organic Chemistry II 3 Credits****Department:** College of Arts and Sciences

A continuation of CHEM 3311.

**Prerequisite(s):** CHEM 3411 or (CHEM 3311 and CHEM 3111)**Corequisite(s):** CHEM 3112**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 3331 Inorganic Chemistry 3 Credits****Department:** College of Arts and Sciences

Generalization involving atomic and nuclear theory; properties of the elements with emphasis on periodicity; non-aqueous solvents, acids, bases, oxidation-reduction, etc.

**Prerequisite(s):** CHEM 1412 or (CHEM 1311 and CHEM 1111)**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 3401 Quantitative Analysis 4 Credits****Department:** College of Arts and Sciences

Theory and practice of analytical chemistry utilizing gravimetric and titrimetric techniques.

**Prerequisite(s):** CHEM 1412 or (CHEM 1312 and CHEM 1112)**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 3415 General Biochemistry 4 Credits****Department:** College of Arts and Sciences

A one semester overview of the chemical processes in living organisms. The class deals with the structure and function of cellular molecules, proteins, carbohydrates, lipids, nucleic acids etc. Designed for non-biochemistry majors.

**Prerequisite(s):** CHEM 1412 or (CHEM 1312 and CHEM 1112)**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 3491 Intro to Forensic Sciences 4 Credits****Department:** College of Arts and Sciences

A survey of the basic principals of forensic science. Oral presentations and projects required.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4101 Special Topics Chemistry 1 Credit****Department:** College of Arts and Sciences

Topics in under-graduate analytical, inorganic, organic and physical chemistry or biochemistry. Library and/or laboratory work and conferences with a faculty member. With permission of the department head, student may repeat the course for credit when the area of study is different. Prerequisite: Approval of instructor and department chair

May be Repeated for a maximum of 6 hours

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4131 Physical Lab 1 Credit****Department:** College of Arts and Sciences

Laboratory applications of modern theory in physical chemistry.

**Prerequisite(s):** CHEM 3401**Prerequisite(s)/Corequisite(s):** CHEM 4311**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4132 Physical Lab 1 Credit****Department:** College of Arts and Sciences

Continuation of CHEM 4131.

**Prerequisite(s):** CHEM 4131 and CHEM 4312**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4141 Inorganic Chemistry II Laboratory 1 Credit****Department:** College of Arts and Sciences

A laboratory to accompany CHEM 4341 Inorganic Chemistry. This laboratory is designed for chemistry majors to introduce synthesis, purification and analysis of transition metal complexes.

**Prerequisite(s):** CHEM 3331 and CHEM 3131 or CHEM 4341**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4271 Intro Research 2 Credits****Department:** College of Arts and Sciences

Problems are on the undergraduate level and emphasizes research techniques. With approval of the department head, these courses may be repeated for credit.

May be Repeated for a maximum of 10 hours

**Restriction(s):**Students with a class of Freshman may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4301 Special Topics Chemistry 3 Credits****Department:** College of Arts and Sciences

Topics in under-graduate analytical, inorganic, organic and physical chemistry or biochemistry. Library and/or laboratory work and conferences with a faculty member. With permission of the department head, student may repeat the course for credit when the area of study is different.

May be Repeated for a maximum of 9 hours

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 4311 Physical Chemistry I 3 Credits****Department:** College of Arts and Sciences

Modern chemical theory as applied to gases, liquids, solids and solutions.

**Prerequisite(s):** CHEM 1412 and (PHYS 1402 or PHYS 2426) and (MATH 3435 or MATH 2414)**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4312 Physical Chemistry II 3 Credits****Department:** College of Arts and Sciences

A continuation of CHEM 4311.

**Prerequisite(s):** CHEM 4311**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4315 Biophysical Chemistry 3 Credits****Department:** College of Arts and Sciences

An overview of the structural and physical properties of biomacromolecules. Includes discussions on protein stability, substrate binding equilibria and structure determination by both experimental and computational methods.

**Prerequisite(s):** MATH 2413 and CHEM 3412**Corequisite(s):** CHEM 4131**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4341 Inorganic 3 Credits****Department:** College of Arts and Sciences

The quantized atom, valency and the chemical bond, and coordination chemistry with applications to biological systems.

**Prerequisite(s):** CHEM 3331 and CHEM 4311**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4371 Intro Research 3 Credits****Department:** College of Arts and Sciences

Problems are on the undergraduate level and emphasizes research techniques. With approval of the department head, these courses may be repeated for credit.

May be Repeated for a maximum of 9 hours

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4381 Chemical Communication 3 Credits****Department:** College of Arts and Sciences

Overview of the fundamental aspects of scientific communication as it pertains to Chemistry, including chemical literature, scientific writing, oral presentations and poster communications.

**Restriction(s):**

Enrollment limited to students with a class of Senior.

Enrollment is limited to students with a major in Biochemistry, Chemistry, Chemistry or Forensic Chemistry.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4401 Special Topics 4 Credits****Department:** College of Arts and Sciences

+Topics in under-graduate analytical, inorganic, organic and physical chemistry or biochemistry. Library and/or laboratory work and conferences with a faculty member. With permission of the department head, student may repeat the course for credit when the area of study is different.

May be Repeated for a maximum of 8 hours

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4411 Biochemistry I 4 Credits****Department:** College of Arts and Sciences

Structures chemistry and functions of biological compounds. A survey of the detailed structures, chemistry and functions of the various classes of biologically important compounds.

**Prerequisite(s):** CHEM 3412**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4412 Biochemistry II 4 Credits****Department:** College of Arts and Sciences

A detailed survey of metabolic pathways and processes.

**Prerequisite(s):** CHEM 4411**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4461 Instrumental Methods of Analysis 4 Credits****Department:** College of Arts and Sciences

Instrumental techniques of chemistry. Theory and practice in modern analytical methods.

**Prerequisite(s):** CHEM 3401 and CHEM 3412 and CHEM 4311 and PHYS 3350**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4471 Introduction to Research 4 Credits****Department:** College of Arts and Sciences

Problems are on the undergraduate level and emphasizes research techniques. With approval of the department head, these courses may be repeated for credit.

May be Repeated for a maximum of 8 hours

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4481 Environmental Analysis 4 Credits****Department:** College of Arts and Sciences

The causes of environmental pollution, how environmental samples are collected and analyzed, and current governmental regulations concerning pollutants.

**Prerequisite(s):** CHEM 3401**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 4491 Forensic Chemistry 4 Credits****Department:** College of Arts and Sciences

A survey of and practice in the principal areas of forensic chemistry including microchemistry and microspectrophotometry. Topics of current interest will be introduced.

**Prerequisite(s):** CHEM 3412 and CHEM 4461 and CHEM 3411**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5121 Graduate Seminar 1 Credit**

**Department:** College of Arts and Sciences

Offered: Spring

**Restriction(s):**

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS, Satisfactory/Unsatisfactory

**CHEM 5201 Special Topics 2 Credits**

**Department:** College of Arts and Sciences

Offered: Other

**Restriction(s):**

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5301 Special Topics 3 Credits**

**Department:** College of Arts and Sciences

The course is designed to meet special needs of students. Each topic is offered on an irregular schedule as the demand requires.

May be Repeated for a maximum of 24 hours

**Restriction(s):**

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS, Satisfactory/Unsatisfactory

**CHEM 5310 Advanced Analytical 3 Credits**

**Department:** College of Arts and Sciences

Prerequisite: Graduate standing or consent of instructor Offered: Other

**Restriction(s):**

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5311 Foundations in Biochemistry I 3 Credits**

**Department:** College of Arts and Sciences

A graduate-level overview of the structures, reactions and functions of the various classes of biologically important compounds.

May be Repeated for a maximum of 6 hours

**Restriction(s):**

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5312 Foundations of Biochemistry II 3 Credits**

**Department:** College of Arts and Sciences

Graduate-level overview of metabolic pathways featuring details on the biochemical molecules in mammalian and bacterial organisms.

May be Repeated for a maximum of 6 hours

**Restriction(s):**

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5315 Advanced Biophysical Chemistry 3 Credits**

**Department:** College of Arts and Sciences

Graduate-level survey of the most important aspects of the structure and physical properties of molecules of biological importance. Includes discussions on biomacromolecule stability, thermodynamics, steady state, enzyme kinetics and inhibition and evaluation of the structure-property relationship using spectrometry and computational methods.

**Restriction(s):**

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5330 Advanced Inorganic 3 Credits**

**Department:** College of Arts and Sciences

Prerequisite: Graduate standing or consent of instructor Offered: Other

**Restriction(s):**

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5350 Advanced Organic 3 Credits**

**Department:** College of Arts and Sciences

Prerequisite: Graduate standing or consent of instructor Offered: Other

**Restriction(s):**

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5361 Chemical Instrumentation 3 Credits**

**Department:** College of Arts and Sciences

Graduate-level overview of chemical instrumentation. Includes theory, components, basic maintenance, analysis of results and development of analytical methods.

**Restriction(s):**

Undergraduate level students may **not** enroll.

**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

**CHEM 5370 Advanced Physical 3 Credits****Department:** College of Arts and Sciences

Prerequisite: Graduate standing or consent of instructor Offered: Other

**Restriction(s):**

Enrollment limited to students with a class of Graduate.

Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 5377 Modern Laboratory Practices 3 Credits****Department:** College of Arts and Sciences

Graduate-level course centered on the laboratory techniques and instrumentation encountered in industry and graduate laboratories. Attention is paid to the details leading to accuracy, precision and reproducibility.

**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 5381 Scientific Communications 3 Credits****Department:** College of Arts and Sciences

Overview of the fundamental aspects of scientific communication with a strong emphasis on Chemistry &amp; Biochemistry. Students will be required to actively participate in advanced chemical literature searches, oral presentations and scientific writing.

**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar**CHEM 5388 Materials Chemistry 3 Credits****Department:** College of Arts and Sciences

This course is designed for graduate-level students and covers three major types of materials being metal, ceramic and soft materials (i.e. polymer-based materials), with a focus on the role of chemistry in materials invention/discovery, advancement and recycling (end of life). Model chemicals are used to illustrate the typical life cycle of a materials product.

**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 5390 Thesis 3 Credits****Department:** College of Arts and Sciences

Must complete both CHEM 5390 and 5391 for required 6 credits.

May be Repeated for a maximum of 9 hours

**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Satisfactory/Unsatisfactory, Registrar do not use FN, Registrar do not use FS, Thesis/Dissertation**CHEM 5391 Thesis 3 Credits****Department:** College of Arts and Sciences

Must complete both CHEM 5390 and 5391 for required 6 credits.

May be Repeated for a maximum of 9 hours

**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Satisfactory/Unsatisfactory, Registrar do not use FN, Registrar do not use FS, Thesis/Dissertation**CHEM 5399 Advanced Forensic Chemistry 3 Credits****Department:** College of Arts and Sciences

A graduate-level overview of the qualitative and quantitative analysis of molecules-related forensic science. Topics include separation, analysis, comparison and discussions on current methods.

**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CHEM 5401 Special Topics 4 Credits****Department:** College of Arts and Sciences

Offered: Other

May be Repeated for a maximum of 12 hours

**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS