

## YEAR 1

<p><b>General Chemistry I or Honors General Chemistry (5)</b> (Fall, Spring, Summer) The first in a two-course sequence for science majors and students in other science-related programs. Topics include atomic structure, molecular structure and bonding, common classes of chemical reactions, stoichiometric calculations, thermochemistry, and properties of gases. Both conceptual understanding and problem-solving skills are emphasized. Three lectures, one recitation, one three-hour laboratory. Prerequisites: 1) high school chemistry or CHEM 1090, and; 2) MATH 1200 or MATH 1220 or MATH 1230 or MATH 1260 or MATH 1280 or MATH 1300 or MATH 1310 or MATH 1340 or Math placement score of 41 or higher. Applicable to the BG Perspective (general education) natural sciences requirement. Extra fee.</p>	<p>CHEM 1250 CHEM 1350</p>
<p><b>General Chemistry II or Honors General Chemistry II (4)</b> (Fall, Spring, Summer) Continuation of the sequence beginning with CHEM 1250. Chemical equilibrium is a major theme of the course. Acid-base chemistry, buffers, and titration curves are studied in detail, as are solubility equilibria. Entropy and Gibbs free energy are introduced and related to equilibrium concepts. Additional topics include chemical kinetics and electrochemistry. Three lectures and one recitation per week. Prerequisite: C or better in CHEM 1250 or CHEM 1350. Corequisite: CHEM 1280. Applicable to the BG Perspective (general education) natural sciences requirement.</p>	<p>CHEM 1270 CHEM 1370</p>
<p><b>General Chemistry Lab or Honors General Chemistry Lab (1)</b> (Fall, Spring, Summer) A laboratory course taken in conjunction with CHEM 1270. One three-hour lab period. Prerequisite: C or better in CHEM 1250 or CHEM 1350. Corequisite: CHEM 1270. Applicable to the BG Perspective (general education) natural sciences requirement. Extra fee.</p>	<p>CHEM 1280 CHEM 1380</p>
<p><i>Calculus and Analytic Geometry I</i></p>	<p>MATH 1310</p>

## YEAR 2

<p><b>Organic Chemistry I (5)</b> (Fall, Summer) The first course of a two-semester sequence of organic chemistry. Nomenclature, bonding, and reactivity of common functional groups. Topics include three-dimensional structure (stereochemistry), electron-pushing mechanisms, electron delocalization, molecular orbital theory and modern instrumental techniques. Laboratory experiences include chemical separations, examination of reaction selectivity, and isolation of natural products. Prerequisites: Chem 1270 and Chem 1280 or Chem 1370 and Chem 1380. Credit Allowed for only one of CHEM 3060, 3410. Extra fee.</p>	CHEM 3410
<p><b>Organic Chemistry II (3)</b> (Spring, Summer) Continuation of CHEM 3410. The second of a two-semester sequence of organic chemistry. Taken in conjunction with laboratory course CHEM 3450 or CHEM 3460. Biological compounds such as carbohydrates, lipids, amino acids, proteins and nucleic acids are studied in addition to the continued study of common functional groups. Other topics include polymers, catalysis, oxidation and reduction reactions, metabolism, pericyclic reactions, and the chemistry of drugs. Three lectures. Prerequisite: C or better in CHEM 3410. Corequisite: CHEM 3450 or CHEM 3460.</p>	CHEM 3440
<p><b>Organic Chemistry Laboratory (2)</b> (Spring, Summer) A laboratory course taken in conjunction with CHEM 3440. Experiences include chemical separations, examination of reaction selectivity, and multi-step synthesis. Chemical tests and modern instrumental techniques are used to identify compounds. Two three-hour lab periods. Prerequisite: C or better in CHEM 3410. Corequisite: CHEM 3440. Extra fee.</p>	CHEM 3450
<p><b>Quantitative Chemical Analysis (3)</b> (Spring) Sampling, sample preparation, calibration, sources of error, propagation of uncertainty, statistics, and quality assurance as they relate to various analytical methods including titrations, gravimetry,</p>	CHEM 2010

electrochemistry, spectrophotometry, and chromatography. Two lectures, one three-hour laboratory. Prerequisite: C or better in CHEM 1270 and CHEM 1280 or CHEM 1370 and CHEM 1380. Extra fee.	
<i>College Physics I</i>	PHYS 2010
<i>or</i>	
<i>University Physics I (strongly recommended)</i>	PHYS 2110
<i>College Physics II</i>	PHYS 2020
<i>or</i>	
<i>University Physics II (strongly recommended)</i>	PHYS 2120
<i>Calculus and Analytic Geometry II</i>	MATH 2320
<i>Calculus and Analytic Geometry III - strongly recommended</i>	MATH 2330

### YEAR 3

<b>Physical Chemistry (4)</b> (Fall) Four lectures. Thermodynamics and quantum chemistry. Prerequisites: CHEM 1370-CHEM 1380 or CHEM 1270-CHEM 1280 and CHEM 2010; MATH 2320 and either PHYS 2120 or PHYS 2020. Corequisite: CHEM 4070.	<b>CHEM 4050</b>
<b>Physical Chemistry (4)</b> (Spring) CHEM 4050 continued. Electrochemistry, kinetics, spectroscopy and molecular structure. Prerequisite: CHEM 4050.	CHEM 4060
<b>Integrated Analytical and Physical Laboratory (2)</b> (Fall) Two three-hour laboratories. Principles of measurement; spectral, chromatographic and electroanalytical techniques; thermodynamic and kinetic measurements; computerized data acquisition. Prerequisite or corequisite: CHEM 4050 or CHEM 3520. Extra fee. Extra fee.	CHEM 4070
<b>Integrated Analytical and Physical Laboratory (2)</b> (Spring) CHEM 4070 continued. Prerequisite: CHEM 4070; prerequisite or corequisite: CHEM 4060. Extra fee.	CHEM 4080
<b>Additional Chemistry and Mathematics Courses</b>	

See below	
-----------	--

## YEAR 4

<b>Instrumental Methods of Analysis (3)</b> (Spring) Theory of instrumental methods of analysis including electroanalytical, spectroscopic and chromatographic methods. Prerequisite: CHEM 4070 or consent of instructor.	CHEM 4540
<b>Additional Chemistry and Mathematics Courses</b> See below	

## ADDITIONAL COURSES

<b>General Biochemistry (3)</b> (Fall) Three lectures. Structure, function, chemical, and physical properties of biomolecules with an emphasis on biomacromolecules. Prerequisite: CHEM 3440 and CHEM 3450 or CHEM 3460. BIOL 2050 is strongly recommended. Credit allowed for only one of CHEM 3080, 4450. OR <b>Basic Biochemistry (3)</b> (Spring, Summer) Three lectures. A survey course of biochemistry including biomacromolecules and metabolism. For students whose program does not require full-year course. Prerequisite: CHEM 3440 and CHEM 3450 or CHEM 3460 or C or better in CHEM 3060; BIOL 1040 and CHEM 2010 recommended. Credit allowed for only one of CHEM 3080, 4450.	CHEM 4450  CHEM 3080
One (1) credit hour from:  <b>Undergraduate Research (1-3)</b> (Fall, Spring, Summer) Independent study and research. Three to nine hours of laboratory, one half-hour conference each week. Not applicable toward minimum requirements of major or minor. Prerequisites: consent of instructor, 20 hours of CHEM or consent of department, 2.5 minimum overall GPA. May be repeated, but no more than three (3) hours credit may be applied toward degree.	CHEM 4130  CHEM 3090

**OR**

**Elementary Biochemistry Laboratory (1)**  
**(Spring, Summer) Basic biochemical techniques.**  
**One three-hour laboratory. Prerequisite or**  
**corequisite: CHEM 3080 or CHEM 4450. Extra**  
**fee.**

**OR**

**Biochemistry Laboratory (1)**  
**Fall. Experimental techniques in biochemistry.**  
**Three-hour laboratory. Prerequisite or**  
**corequisite: CHEM 4450. Extra fee.**

CHEM 4460

<p><b>Advanced Inorganic Chemistry (3)</b>  (Fall) Chemical bonding, stereochemistry, acid-base chemistry, periodicity, nonmetal and transition metal chemistry, organometallic and bioinorganic chemistry. Prerequisite: CHEM 4050.</p>	<p>CHEM 4630</p>
<p><b>Organic Reaction Mechanisms (3)</b>  (Spring) Fundamentals of organic reaction mechanisms and methods of their elucidation. Prerequisite: CHEM 3440 and CHEM 3450 or CHEM 3460. Prerequisite or corequisite: CHEM 4050.  OR  <b>General Biochemistry (3)</b>  (Spring) Three lectures. Energetics and regulation of metabolic processes. Prerequisite: CHEM 4450.  OR  <b>Spectroscopic Methods in Organic Chemistry (3)</b>  (Fall) Organic structure determination by spectroscopic techniques, with emphasis on infrared, ultraviolet and nuclear magnetic resonance spectroscopy, and mass spectrometry. Prerequisite: CHEM 3440 and CHEM 3450 or CHEM 3460. Prerequisite or corequisite: CHEM 4050.</p>	<p>CHEM 4420</p> <p>CHEM 4470</p> <p>CHEM 4660</p>
<p><i>Elementary Linear Algebra (3) - strongly recommended</i>  OR  <i>Differential Equations (3) - strongly recommended</i></p>	<p>MATH 3302</p> <p>MATH 3370</p>