

DEPARTMENT OF CHEMISTRY

Head: Brian D. Pate

*Allen*Chemistry Program for Non-chemistry Majors

A three semester sequence of Chem 101-3, 106-2, 102-3, 116-2, 251-3 and 256-2 or Chem 101-3, 106-2, 102-3, 116-2, 261-3, 216-2 is recommended.

Note: Students with a passing record (or better) in high school chemistry (Chemistry 91, Chem. Study or equivalent) may, at the discretion of the Department, be given advanced standing in Chem. 101-3 and 106-2 and proceed to 102-3 and 116-2 immediately.

Chemistry Program for Students Intending to Major in Chemistry

A minimum of 50 semester hours in Chemistry, or related topics approved by the Department, is required, together with ordinarily 18 but not less than 14 semester hours of Physics and a minimum of 15 semester hours of Mathematics. It is recommended that these latter courses be taken as early in the program as possible so that they will be of benefit in the study of chemistry.

The following is a recommended minimum program:

Semester 1	Chem 101-3 General Chemistry I	(3-1-0)
	Chem 106-2 Chemistry Laboratory	(0-0-4)
	Phys 101-3 General Physics I	(3-1-0)
	Math 111-3 Fundamental Math I	(3-1-0)
	Plus at least one other course	
Semester 2	Chem 102-3 General Chemistry II	(3-1-0)
	Chem 116-2 Qualitative Analysis Laboratory	(0-0-4)
	Phys 102-3 General Physics II	(3-1-0)
	Math 112-3 Fundamental Math II	(3-1-0)
	Plus at least one other course	
Semester 3	Chem 251-3 Organic Chemistry I	(3-1-0)
	Chem 256-2 Organic Chemistry Laboratory I	(0-0-4)
	Phys 211-3 Mechanics I	(3-1-0)
	Phys 231-3 Introductory Physics Laboratory I	(0-0-4)
	Math 213-3 Calculus I	(3-1-0)
Semester 4	Chem 261-3 Physical Chemistry I	(3-1-0)
	Chem 216-2 Quantitative Analysis Laboratory	(0-0-4)
	Phys 221-3 Electricity and Magnetism I	(3-1-0)
	Phys 232-3 Introductory Physics Lab II	(0-0-4)
	Math 214-3 Calculus II or Math 231-3 Algebra and Geometry	(3-1-0)

- Notes: 1. Students intending to pursue advanced study in Chemistry should acquire a reading knowledge of German and/or Russian as early in their program as possible.
2. Students intending to specialise in Organic or Biochemistry should take Biology 100 or Biology 100B Plus Biology 201.

The second four semesters must include 30 additional semester hours of chemistry, or related topics approved by the Department.

Chemistry Program for Students Intending to Take Honours in Chemistry

Students intending to take honours in Chemistry will, in the first four semesters, pursue a program in common with students majoring in Chemistry.

To graduate with honours, a student must complete, in semesters 5 to 8 inclusive, 52 additional semester hours either in Chemistry or in related courses specified by the Department. These will include at least one course from the graduate calendar in Chemistry. The student may also submit a laboratory or library thesis making an original contribution to knowledge, and prepared under the direction of a member of the Chemistry faculty. Additional graduate course work and a final comprehensive examination may be substituted for the thesis by permission of the Department.

<u>Presentation of Courses</u>	<u>Courses to be Offered</u>
Summer Semester 1966	Chemistry 101-3, 106-2, 251-3, 256-2, 261-3, 216-2
Fall Semester 1966	Chemistry 101-3, 106-2, 102-3, 116-2, 251-3, 256-2, 261-3, 216-2, 431-3, 436-2, 451-3, 456-2, 461-3, 466-2, 421-3
Spring Semester 1967	Chemistry 101-3, 106-2, 102-3, 116-2, 251-3, 256-2, 261-3, 216-2, 441-3, 446-2, 452-3, 457-5, 471-3, 467-2, 422-3
Summer Semester 1967	Chemistry 101-3, 106-2, 251-3, 256-2, 261-3, 216-2, 431-3, 436-2, 451-3, 456-2, 461-3, 466-2

Description of Courses

Chemistry

101-3 General Chemistry I

(3-1-0)

General fundamental concepts and nomenclature; stoichiometry and chemical calculations; descriptive inorganic chemistry of common elements; nuclear, atomic and molecular structure; properties of ionic and covalent molecules; structural formulae of simple aliphatic and aromatic organic compounds, isomerism; properties of gases, liquids, solids and solutions.

Prerequisite: One year (British Columbia High Schools) Algebra; Physics 101-3 and Mathematics 111-3 must ordinarily precede or be taken concurrently; Chemistry 106-2 must ordinarily be taken concurrently by students proceeding to 200 level courses in Chemistry, or permission of the Department obtained.

102-3 General Chemistry II

(3-1-0)

Introduction to chemical kinetics; acid-base equilibrium; solubility; electrochemistry; conductance; activity; stereochemistry of coordination compounds; elements of thermodynamics.

Prerequisite: Chemistry 101-3; students may by-pass Chemistry 101-3 and 106-2 by acquiring a satisfactory grade in a chemistry placement examination; Chemistry 116-2 must ordinarily be taken concurrently by students proceeding to 200 level courses in Chemistry.

106-2 Chemistry Laboratory

(0-0-4)

Experiments in general Inorganic and Physical Chemistry which illustrate principles described in Chemistry 101-3. Chemistry 101-3 must ordinarily be taken concurrently.

116-2 Qualitative Analysis Laboratory

(0-0-4)

Chemistry of common elements and qualitative analysis.

Prerequisite: Chemistry 106-2; Chemistry 102-3 must ordinarily precede or be taken concurrently.

216-2 Quantitative Analysis Laboratory

(0-0-4)

Estimation of chemical compounds by gravimetric, volumetric, electrometric and colorimetric analysis.

Prerequisite: Chemistry 116-2

251-3 Organic Chemistry I

(3-1-0)

Discussion of general physical and chemical properties of saturated and unsaturated aliphatic compounds, benzene, substituted mononuclear compounds, alkyl halides, alcohols, ethers, amines, carboxylic acids, aldehydes and ketones. Consideration of free radical and ionic reaction mechanisms.

Prerequisite: Chemistry 102-3; Chemistry 256-2 must ordinarily be taken concurrently.

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256-2 Organic Chemistry Laboratory I

(0-0-4)

Laboratory preparation and characterization of monofunctional organic compounds.

Prerequisite: Chemistry 116-2; Chemistry 251-3 must ordinarily precede or be taken concurrently.

261-3 Physical Chemistry I

(3-1-0)

Elements of physical chemistry from the macroscopic point of view. Thermodynamics, phase changes and equilibria, thermochemistry, chemical equilibrium, solutions, rate processes and chemical kinetics, surface phenomena.

Prerequisites: Chemistry 102-3; Mathematics 112-3.

416-5 Instrumental Analysis

(2-0-6)

Application of modern instrumental techniques in chemical analysis. Chromatography, UV and IR spectrometry, NMR spectrometry, radioactive tracer techniques, radioactivation analysis, thermogravimetry.

Prerequisite: Chemistry 461-3

421-3 Biochemistry I

(3-1-0)

Structure of compounds and mechanisms of reactions of biological interest.

Prerequisite: Chemistry 251-3 and 256-2

422-3 Biochemistry II

(3-1-0)

Continues Chemistry 421-3.

Prerequisite: Chemistry 421-3 and 426-2

426-2 Biochemistry Laboratory I

(0-0-4)

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(3-1-0)

431-3 Inorganic Chemistry

Survey of the periodic table in terms of fundamental theories and concepts; descriptive chemistry of selected groups; electron deficient systems; the transition metals; co-ordination compounds; the lanthanides and actinides; the inert gases

Prerequisite: Chemistry 261-3

Corequisite: Chemistry 461-3 and Chemistry 436-2

436-2 Inorganic Chemistry Laboratory

(0-0-4)

Preparation of inorganic complexes; determination of physical properties via spectroscopic and magnetic susceptibility analysis. Applications involving high-vacuum and non-aqueous solvent techniques.

Corequisite: Chemistry 432-3

441-3 Nuclear Chemistry and Radiochemistry

(3-1-0)

Nuclear structure, radioactive decay, interaction of nuclear radiation with matter, nuclear reactions, nuclear models. Application of radioactivity to problems of chemical interest.

Prerequisite: Chemistry 102-3, Mathematics to differential equations.

446-2 Nuclear Chemistry and Radiochemistry Laboratory

(0-0-4)

The statistics of radioactive decay, operation of radiation detectors, measurement of nuclide half-lives, absorption of radiation in matter, radiation energy measurements, analysis of complex gamma-spectra, measurement of nuclear reaction cross sections.

Prerequisite: Chemistry 441-3 or concurrent registration in Chemistry 441-3, or permission of the Department.

451-3 Organic Chemistry II

(3-1-0)

Modern theories and techniques in studies of the structure of organic compounds and the mechanisms of organic chemical reactions.

Prerequisite: Chemistry 251-3 and 256-2

452-3 Structure and Mechanism in Organic Chemistry

(3-1-0)

Prerequisite: Chemistry 451-3 and 456-2

456-2 Organic Chemistry Laboratory II

(0-0-4)

Organic reactions and analysis.

Corequisite: Chemistry 451-3 or permission of the Department.

457-5 Modern Laboratory Techniques in Organic Chemistry

(2-0-4)

Application of chromatography, U-V and I-R spectrometry and NMR spectrometry in the identification and structure determination of

organic compounds.

Prerequisite: Chemistry 451-3 and 456-2

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451-3 Physical Chemistry II

(3-1-0)

Physical chemistry from the microscopic point of view. Elementary quantum mechanics, statistical mechanics, kinetic theory of gases, statistical thermodynamics, introduction to molecular spectroscopy.

Prerequisite: Chemistry 261-3; Mathematics 214-3 must ordinarily precede or be taken concurrently.

452-3 Molecular Spectroscopy

(3-1-0)

466-2 Physical Chemistry Laboratory I

(0-0-4)

Experiments in thermodynamics, chemical kinetics, electrochemistry and atomic and molecular structure.

Corequisite: Chemistry 461-3 or permission of the Department.

467-2 Physical Chemistry Laboratory II

(0-0-4)

Continues Chemistry 466-2.

Corequisite: Chemistry 460-3

468-2 Physical Chemistry Laboratory III

(0-0-4)

Specialized techniques in experimental physical chemistry; high vacuum techniques, optical spectrography, NMR, mass spectrometry, glass-blowing, electronics.

Prerequisite: Chemistry 461-3 and 467-2

471-3 Quantum Chemistry

(3-1-0)

Introduction to Quantum Chemistry. Hybridization, group theory, molecular-orbital and valence-bond treatment of simple molecules. Some recent developments.

481-3 Undergraduate Research

Laboratory or library research, for preparation of thesis for the honours degree in Chemistry.

Prerequisite: Permission of the Department.