

## Glasgow Chemistry Level 2 - Fall semester course offerings

Course Name	Course code	Scotcat credits	Course description
Molecular Thermodynamics			To give an introduction to the molecular basis of thermodynamics and show how basic thermodynamic concepts and properties of matter are related to chaotic molecular properties by a common-sense statistical approach, with examples and applications in simple systems. <b>A background course in calculus is recommended.</b>
Main Group Chemistry			This course gives an overview of main group element properties in respect to their diverse chemistry, with emphasis on ionisation potentials, electron affinities and electronegativity. Emphasis is given to typical trends in bonding and reactivity, rationalization of observed oxidation states across the main group, and the use of oxidation states and VSEPR theory to predict structure and bonding – applied to; noble gas compounds, other main group compounds as well as limitations of VSEPR theory. To introduce the concepts of Lewis acid and base and contrast with Brønsted acid (and base). Use and applications of Lewis acids. Extend Lewis acid idea to coordination and solvation. Ion pair interactions, chelate and macrocyclic effects. Oxo anion aqueous chemistry, electron transfer and redox behaviour, use of reduction potentials, and Latimer oxidation state diagrams. <b>A year in organic chemistry is strongly recommended.</b>
Quantum Mechanics and Chemical Bonding			This course will cover the historical development of quantum theory; wave-particle duality; the photoelectric effect, Davisson-Germer experiment, de Broglie wavelength, Heisenberg uncertainty relations; the Schrodinger equation, wavefunctions. Simple models: particles in free space, particle in a box. As well as covering electrons in atoms; atomic orbitals, electrons in diatomic molecules; molecular orbitals as combinations of atomic orbitals, bonding and anti-bonding orbitals, bond order, and Hund's rule, extensions to larger molecules: triatomics, and Hückel approach to unsaturated hydrocarbons. <b>A background course in calculus is strongly recommended.</b>

Course Name	Course code	Scotcat credits	Course description
Organometallic Chemistry			The chemistry of main group element organometallics will be developed first, as many of the principles encountered here also apply to transition metal derivatives. Reactivity patterns, structures and bonding will be related to periodic position of the elements involved, and examples of applications and uses cited throughout. Preparative methods will be explained. Transition metal organometallics will be developed via metal carbonyls and other p-bonded complexes, before proceeding to h1-derivatives. The use of the 18-electron rule will be emphasised. <b>A background course in organic chemistry is recommended.</b>

## Glasgow Chemistry Level 2 - Spring semester course offerings

Course Name	Course code	Scotcat credits	Course description
Spectroscopy: seeing molecules in different lights			This course explains the different ways in which electromagnetic radiation may interact with molecules and how this may be used. The electromagnetic spectrum and units of measurement. Vibrational spectra, mathematical interpretation and reduced mass. Vibrational spectra of polyatomic molecules: H <sub>2</sub> O, CO <sub>2</sub> , CH <sub>2</sub> O. Group frequencies. Nuclear magnetic resonance spectroscopy, origins and brief theory, active nuclei, chemical shifts for proton and carbon-13, spin-spin coupling. Interpretation of <sup>1</sup> H, <sup>19</sup> F, <sup>13</sup> C and <sup>31</sup> P NMR spectra and mass spectrometry are all covered. <b>A background course in calculus is strongly recommended, as well as a year of physical chemistry.</b>
Aromatic Chemistry: tastes, smells, colours, bangs			This course will consider the basis of aromaticity and the synthesis, chemical reactivity, properties and importance of simple benzene derivatives. <b>A year of organic chemistry is recommended.</b>
Biophysical Chemistry			A review of structural and chemical features of biomacromolecules. The basics of electromagnetic radiation; its interaction with dipolar molecules and how the nature of the chromophore in the biomolecule characterizes its spectrum. The uses of UV/visible spectroscopy in protein chemistry in determining protein concentration and activity. An introduction to circularly polarized light and the use of circular dichroism in determining secondary structure. The use of fluorescence in biomolecular chemistry and the information that can be derived by this technique. Determining the accurate mass of proteins by the use of electrospray (ESI) and MALDI mass spectrometry. <b>A year of physical chemistry is recommended.</b>

### Glasgow Chemistry Level 2 - 1st term of Full year courses

Course Name	Course code	Scotcat credits	Course description
Organic Chemistry I Specifically for Principia Students (Semester 1)		20	To introduce synthetic strategy with particular emphasis on chemoselectivity and protecting group chemistry; to illustrate the course with the synthesis of chemicals used in every day life such as pharmaceuticals, perfumes, and flavorings. <b>The content discussed is similar to a first semester organic chemistry course taught in the US.</b>
Organic Chemistry II Specifically for Principia Students (Semester 2)		20	To provide a general introduction to the applications of organic chemistry including medicinal, biological and supramolecular chemistry and utilization of natural products and their ecological significance. <b>The content discussed is similar to a second semester organic chemistry course taught in the US.</b>