CHEM 1004 ESSENTIAL CHEMISTRY 1 (WSTC)

Credit Points 10

Legacy Code 700121

Coordinator Phillip Newman (https://directory.westernsydney.edu.au/search/name/Phillip Newman/)

Description This subject provides an introduction to some of the essential knowledge, concepts and skills of chemistry, to serve the needs of students majoring in chemistry and those requiring a working knowledge of chemistry. Observable chemical facts and phenomena including structure, dynamics, and energetics, are explained in terms of current mathematical and visual models and further developed in Essential Chemistry 2. Evidence for chemical understanding is provided using IR spectroscopy, mass spectrometry, and computer molecular modelling. Laboratory skills relate theory to practice through the development of practical skills required to determine the concentration of an analyte using volumetric and spectrophotometric analysis.

School Science

Student Contribution Band HECS Band 2 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 1 subject

Equivalent Subjects CHEM 1001 - Chemistry 1 CHEM 1003 - Essential Chemistry 1 CHEM 1011 - Principles of Chemistry LGYB 0460 - Chemistry 1 (UWSC)

Restrictions Students must be enrolled at Western Sydney University, The College. Students enrolled in Extended Diplomas must pass 40 credit points from the preparatory subjects listed in the program structure prior to enrolling in this University level subject. Students enrolled in the combined Diploma/Bachelor programs listed below must pass all College Preparatory subjects listed in the program structure before progressing to the Year 2 subjects.

Assumed Knowledge

HSC Chemistry (2 unit) or HSC Multi-strand Science (3 or 4 unit) or equivalent. General Mathematics bands 5 and 6 or Mathematics band 4 or equivalent. WSTC Prep chemistry.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Explain chemistry concepts accurately, clearly, and concisely, using an appropriate combination of everyday language with correct spelling and grammar; specialist chemical terms and notation; mathematics (equations, graphs); molecular-level representations; and labelled diagrams.
2. Demonstrate competence in the manipulative laboratory skills and deductive skills involved in volumetric, spectrophotometric, and qualitative analysis.
3. Calculate quantities using mathematical formulas, and expressing them with the appropriate number of significant figures, and in some cases, uncertainty.
4. Describe an atom's chemical personality of by relating its position in the Periodic Table to its electron configuration, and ratio of effective nuclear charge Zeff, to average distance r of the valence electrons from the nucleus.
5. Predict the physical properties of a substance based on its classification as a metal, ionic compound, molecular substance, or network substance and the types of intra- and intermolecular bonding involved.
6. Explain how IR spectra and data from mass spectrometry provide experimental evidence for the composition, connectivity (which atoms are bonded together), and formula for a compound.
7. Identify a reaction as an example of a Lewis acid-base reaction (complexation or proton exchange) or a redox reaction (electron exchange), identify the donors and acceptors, express the extent of reaction quantitatively in terms of the reaction quotient, Q, and predict the direction of reaction from the difference between Q and the

Subject Content

1. Atomic structure and periodicity.
2. Pure substances - physical properties, structure and bonding.
3. Lewis acid-base reactions (dissolving, precipitation, complexation, proton exchange) and redox reactions in aqueous systems.
4. Introduction to chemical thermodynamics.
5. Structure, shape and bonding within and between molecules.
6. Colligative properties of solutions.
7. Chemical systems at equilibrium, and open 'living' systems.
8. Chemical speciation and buffering in aqueous solution as a result of competitive equilibria.
9. Stoichiometric concepts in volumetric and spectrophotometric analysis.

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Practical Log/ Workbook	3 hours/ week x 5 weeks	20	Y	Individual	
Intra-session Exams x 5	30 minutes x 5	20	N	Individual	
Intra-session Exam (Mid-term)	1.5 hours	20	N	Individual	
Final Exam	2 hours	40	Y	Individual	

Prescribed Texts

- Mahaffy, P, Tasker, R, Bucat, B, Kotz, J, Weaver, GC, & Treichel, P, et al. 2015, Chemistry: human activity, chemical reactivity, 2nd International Edition, Nelson Education, Toronto.
- Recommended: Odyssey Molecular Modelling Software v4.x. Wavefunction Inc