CHEMICAL SCIENCES (CHEM)

CHEM 0001 Chemistry (WSTC Prep) (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem0001/) **Legacy Code:** 700043
This subject is a platform to introduce Chemistry to students. It introduces students to the basic concepts required to satisfy the needs of most first year university science subjects in both skill and content areas. It is intended that students will gain a greater understanding of the theoretical concepts covered in the subject by completing the practical component of the subject. Students will also be introduced to professional pathways in science.
Level: Undergraduate Level 0 Preparatory subject
Equivalent Subjects: CHEM 0002 - Chemistry (UWSC)
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 0002 Chemistry (WSTC) (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem0002/) **Legacy Code:** 900024
This subject introduces students to the basic concepts required to satisfy the needs of most first year university science courses in both skill and content areas. It is intended that students will gain a greater understanding of the theoretical concepts covered in the course by completing the practical component of the course. Students will also be introduced to professional pathways in science.
Level: Undergraduate Level 0 Preparatory subject
Equivalent Subjects: CHEM 0001 - Chemistry (WSTC Prep)
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 1003 Essential Chemistry 1 (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1003/) **Legacy Code:** 300800
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.
Level: Undergraduate Level 1 subject
Equivalent Subjects: CHEM 1001 - Chemistry 1 CHEM 1011 - Principles of Chemistry CHEM 1004 Essential Chemistry 1
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 1004 Essential Chemistry 1 (WSTC) (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1004/) **Legacy Code:** 700121
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.
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: Please see the Subject Details page for any restrictions for this subject

CHEM 1005 Essential Chemistry 2 (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1005/) **Legacy Code:** 300803
This subject introduces an investigation of the reactivity of covalent molecules, in particular, of carbon-based compounds. Focusing on introductory chemical dynamics and thermodynamics, students will develop an in-depth understanding of the structure, nomenclature and reactivity of the principal organic functional groups, extending their basic principles of chemistry. They will also understand how molecules are synthesised and the ways they react being important in the function and role of chemistry in biological systems in our domestic and industrial worlds.
Level: Undergraduate Level 1 subject
Equivalent Subjects: CHEM 1002 - Chemistry 2 CHEM 1010 - Medicinal Chemistry CHEM 1006 - Essential Chemistry 2 (WSTC)
Incompatible Subjects: LGYB 6352 - Biological Chemistry 12D
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 1006 Essential Chemistry 2 (WSTC) (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1006/) **Legacy Code:** 700122
This subject introduces an investigation of the reactivity of covalent molecules, in particular, of carbon-based compounds. Focussing on introductory chemical dynamics and thermodynamics, students will develop an in-depth understanding of the structure, nomenclature and reactivity of the principal organic functional groups, extending their basic principles of chemistry. They will also understand how molecules are synthesised and the ways they react being important in the function and role of chemistry in biological systems in our domestic and industrial worlds.
Level: Undergraduate Level 1 subject
Equivalent Subjects: CHEM 1002 - Chemistry 2 CHEM 1010 - Medicinal Chemistry LGYB 0462 - Chemistry 2 (UWSC) CHEM 1005 - Essentials of Chemistry 2
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 1008 Introductory Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1008/) **Legacy Code:** 300808
The chemical sciences underpin our understanding in the environmental, forensic, health, medical, biological and physical sciences. This subject familiarises students with the fundamental principles of chemistry and how chemistry shapes the world around us. Students will be introduced to the concepts of atomic structure, the reactivity of substances, the Periodic Table, stoichiometry, and will learn about the structure and reactivity of substances and mixtures in different chemical environments, and exposed to different forms of electromagnetic radiation. Students will explore real world problems and apply the fundamental principles of chemistry to better understand how we may shape our own future.
Level: Undergraduate Level 1 subject
Incompatible Subjects: CHEM 1003 Essential Chemistry 1
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 1009 Introductory Chemistry (WSTC) (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1009/) **Legacy Code:** 700155
The chemical sciences underpin our understanding in the environmental, forensic, health, medical, biological and physical sciences. This subject familiarises students with the fundamental principles of chemistry and how chemistry shapes the world around us. Students will be introduced to the concepts of atomic structure, the reactivity of substances, the Periodic Table, stoichiometry, and will learn about the structure and reactivity of substances and mixtures in different chemical environments, and exposed to different forms of electromagnetic radiation. Students will explore real world problems and apply the fundamental principles of chemistry to better understand how we may shape our own future.
Level: Undergraduate Level 1 subject
Equivalent Subjects: CHEM 1008 - Introductory Chemistry
Incompatible Subjects: CHEM 1003 - Essential Chemistry 1 CHEM 1004 - Essential Chemsitry 1 (WSTC)
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 1012 Essential Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1012/) **Legacy Code:** 301451
This subject introduces an investigation of the reactivity of covalent molecules, in particular, of carbon-based compounds. Focusing on introductory chemical dynamics and thermodynamics, students will develop an in-depth understanding of the structure, nomenclature and reactivity of the principal organic functional groups, extending their basic principles of chemistry. They will also understand how molecules are synthesised and the ways they react being important in the function and role of chemistry in biological systems in our domestic and industrial worlds.
Level: Undergraduate Level 1 subject
Equivalent Subjects: CHEM 1002 - Chemistry 2 CHEM 1010 - Medicinal Chemistry CHEM 1006 - Essential Chemistry 2 (WSTC) CHEM 1005 - Essential Chemistry 2
Incompatible Subjects: LGYB 6352 - Biological Chemistry 12D
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 1013 Essential Chemistry (WSTC) (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem1013/) **Legacy Code:** 700333
This subject introduces an investigation of the reactivity of covalent molecules, in particular, of carbon-based compounds. Focussing on introductory chemical dynamics and thermodynamics, students will develop an in-depth understanding of the structure, nomenclature and reactivity of the principal organic functional groups, extending their basic principles of chemistry. They will also understand how molecules are synthesised and the ways they react being important in the function and role of chemistry in biological systems in our domestic and industrial worlds.
Level: Undergraduate Level 1 subject
Equivalent Subjects: CHEM 1006 Essential Chemistry 2 CHEM 1002 Chemistry 2 CHEM 1010 Medicinal Chemistry CHEM 1005 Essential Chemistry 2 LGYB 0462 Chemistry 2 (WSTC)
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 2001 Analytical Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem2001/) **Legacy Code:** 300832
This subject provides insight into both classical methods of analytical analysis and an introduction to modern instrumental methods of analysis. Specifically, the classical methods of analysis include volumetric and gravimetric methods, while the modern instrumental methods include separation techniques and spectroscopy. The role of spreadsheets in data analysis and presentation is discussed and applied in the laboratory program.
Level: Undergraduate Level 2 subject
Pre-requisite(s): CHEM 1008 Introductory Chemistry
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 2006 Inorganic Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem2006/) **Legacy Code:** 300899
This subject introduces students to a thorough study of coordination chemistry (discussing complexes, ligands, structure, isomerism, stability, reaction mechanisms, oxidation states, elements in the first transition series, coordination chemistry in biological systems). The subject then moves on to areas of fundamental inorganic chemistry, including bonding, and solid state chemistry. Advanced Modules cover the following topics: spectroscopy in coordination complexes, physiology and inorganic chemistry, and medicinal inorganic chemistry. This subject also introduces many of the laboratory techniques and equipment that are used in synthetic procedures in coordination chemistry.
Level: Undergraduate Level 2 subject
Pre-requisite(s): CHEM 1008 Introductory Chemistry
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 2008 Organic Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem2008/) **Legacy Code:** 300876
Organic molecules are at the heart of the chemistry of life and industry. This subject builds on the fundamental chemical principles, exploring reaction mechanisms and the concept of reactivity and stereo- and regio-selectivity of many of the central reactions that form the basis of living processes, modern research, and contemporary industrial transformations. The subject contains a problem-based module on the application of spectroscopic methods to organic structure elucidation, focusing on spectroscopic data and a practical section on organic synthesis. The subject will focus on complex organic molecules including biologically relevant molecules, and examples from chemical industries, medicinal and pharmaceutical industries.
Level: Undergraduate Level 2 subject
Pre-requisite(s): CHEM 1012 Essential Chemistry
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 2010 Physical Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem2010/) **Legacy Code:** 300849
Physical Chemistry describes the fundamentals of energy changes in chemical systems (thermodynamics), the rates and mechanisms of chemical reactions (kinetics), and electrochemistry and/or ion and electron transport. These concepts will be applied to a range of chemical and/or biochemical processes. A major focus of the subject will be to develop the ability to study quantitative chemical/biochemical problems, and develop useful physical chemistry experimental and data-analysis skills.
Level: Undergraduate Level 2 subject
Pre-requisite(s): CHEM 1008 Introductory Chemistry
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3001 Advanced Analytical Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3001/) **Legacy Code:** 300925
This subject builds on Analytical Chemistry 2 and focuses more on instrumental analysis, isolation and cleanup techniques and aspects of quality control and quality assurance in an analytical laboratory and in manufacturing are discussed. The instrumental methods covered include atomic spectroscopy (for example, atomic absorption and emission, x-ray fluorescence), molecular spectroscopy (for example, UV-Vis, IR, fluorometry, mass spectrometry), chromatography, electrochemistry, thermal methods and automated methods. The theory of the instrumental methods, their construction, operation and applications are covered. The theory and application of isolation and cleanup techniques in inorganic and organic residue analysis are given.
Level: Undergraduate Level 3 subject
Pre-requisite(s): CHEM 2001
Equivalent Subjects: CHEM 3006 - Analytical Chemistry 3 CHEM 3002 - Advanced Chemical Analysis
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3003 Advanced Inorganic Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3003/) **Legacy Code:** 300907
Building on the foundations laid in Inorganic Chemistry, this subject focuses on structure and bonding in inorganic chemistry, and the stereochemistry of coordination complexes. Spectroscopic and magnetic properties of inorganic compounds are evaluated as a consequence of structure and bonding, and an introduction to X-ray methods for structure determination is given. Kinetics and mechanism of inorganic reactions are examined, and the area of bioinorganic chemistry is developed. Unique structures and reactions of organotransition metal chemistry are explored. Advanced Modules cover aqueous chemistry of cations and oxyanions, inorganic materials, molecular orbital theory in coordination complexes, group theory; lanthanides and actinides.
Level: Undergraduate Level 3 subject
Pre-requisite(s): CHEM 2004 OR
CHEM 2007 OR
CHEM 2006
Equivalent Subjects: LGYB 9729 - Inorganic Chemistry 3 CHEM 3011 - Inorganic Chemistry 3 LGYA 6134 - Advanced Inorganic Chemistry
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3004 Advanced Organic Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3004/) **Legacy Code:** 300906
This subject builds on the reactions learnt in the subject Organic Chemistry, extending the range of C-C bond forming reactions to include the most significant in modern synthesis. In the second stage students learn to develop multistep synthetic strategies to produce target molecules using their level 2 organic chemistry and the reactions above. Structural analysis by mass spectroscopy and more advanced NMR techniques is also investigated. The students use this chemistry in a lab course designed to highlight a number of these concepts (including the synthesis of 2 pharmaceutical compounds and a team experiment) and to extend their range of practical skills.
Level: Undergraduate Level 3 subject
Pre-requisite(s): CHEM 2008
Equivalent Subjects: LGYA 6141 - Drug Design and Synthesis CHEM 3013 - Organic Chemistry 3
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3005 Advanced Physical Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3005/) **Legacy Code:** 300926
Advanced Physical Chemistry builds on the fundamental principals of energy changes in systems (thermodynamics), and the rates and mechanisms of reactions (kinetics) learnt in Physical Chemistry and extends this so that students gain an understanding of more advanced topics in this field of chemistry such as polymers, colloids, surfaces, quantum principles and spectroscopy. This subject also will strengthen student's problem solving skills in quantitative chemical analysis, develop experimental techniques and advanced data-analysis skills.
Level: Undergraduate Level 3 subject
Pre-requisite(s): CHEM 2010
Equivalent Subjects: CHEM 3015 - Physical Chemistry 3
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3008 Biodevices (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3008/) **Legacy Code:** 300890
This subject replaces 300414 - Biodevices from Autumn 2014. The subject will investigate nature's nanomachines; lipids, DNA and proteins. The students will learn how only a few basic building blocks can self-assemble into more complex structures, which in turn self-assemble into more complex hierarchical structures from which one can build biodevices. These fascinating self-organising supramolecular structures generally involve some kind of non-covalent binding. Particular emphasis is placed on the underlying principles that govern the functioning of such machines and some coverage of the modelling of such processes using techniques such as statistical thermodynamics is given. Biological computing is also covered.
Level: Undergraduate Level 3 subject
Equivalent Subjects: LGYA 6025 - Biodevices
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3010 Forensic Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3010/) **Legacy Code:** 300868
This subject extends the student's knowledge and understanding of chemical topics that are relevant to forensic investigations, and provides a deeper understanding of the underlying chemical and physical principles. Topics are taught in the context of the correct principles and procedures for collecting and conserving evidence, and the safe handling of chemical substances. Topics include an extended range of modern chemical instrumentation; the chemistry and analysis of various classes of drugs; clandestine drug laboratories; fire, arson and accelerants; explosions and explosives; and various forms of trace evidence (including textile fibres, glass and paint).
Level: Undergraduate Level 3 subject
Pre-requisite(s): NATS 2019 Forensic and Environmental Analysis
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3012 Nanochemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3012/) **Legacy Code:** 300895
The subject covers basic theory of surface chemistry, latest technologies of surface depositions and industrial and commercial applications of nanomaterials and nanopowders. Upon successful completion, the students will achieve an in-depth understanding of techniques of preparation of nanomaterials and nanopowders that includes plasma arching, chemical vapour deposition, electrodeposition, sol-gel synthesis, ball milling and the use of natural particles. Technical aspects of process control on the microstructure and properties of coatings will be discussed. Case studies of applications of nanopowders and nanomaterials such as biomedical implants, insulators, high power magnets, molecular sieves, supercomputers, jet engines and other industrial applications will be pursued.
Level: Undergraduate Level 3 subject
Pre-requisite(s): CHEM 1003
Equivalent Subjects: LGYA 6162 - Nanochemistry LGYA 6030 - Nanopowders and Nanomaterials
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 3014 Pharmacological Chemistry (10 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem3014/) **Legacy Code:** 300920
This subject is aimed at undergraduates with grounding in chemistry and biochemistry who have an interest in a career related to medicinal chemistry. Because it concerns the manner in which foreign molecules can interact with the body's mechanisms it is of direct relevance not only to the pharmaceutical industry but also to the food, agricultural, cosmetic (etc) industries. It conveys the fascination of designing chemical structures for particular uses within biological systems and which overlap the disciplines of chemistry, biochemistry, cell biology and pharmacology. Emphasis is placed upon design of the chemical structure itself rather than an investigation of the specific chemical structure of its site of action in the body. This is reflected in the laboratory work which traces the historical development of drug design, essentially through a process of a series of inorganic syntheses, relevant to a range of common drugs.
Level: Undergraduate Level 3 subject
Equivalent Subjects: LGYA 5935 - Pharmacological Chemistry
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 9001 Higher Degree Research Thesis - Functional Genomics (10,20 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem9001/) **Legacy Code:** 800144
Level: PhD and Research Masters Level 9 subject
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 9002 Higher Degree Research Thesis - Nanotechnology (10,20 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem9002/) **Legacy Code:** 800142
Level: PhD and Research Masters Level 9 subject
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 9003 Higher Degree Research Thesis - Chemical Sciences (10,20 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem9003/) **Legacy Code:** 800075
Level: PhD and Research Masters Level 9 subject
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 9004 Higher Degree Research Thesis - Chemistry (10,20 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem9004/) **Legacy Code:** 800132
Level: PhD and Research Masters Level 9 subject
Restrictions: Please see the Subject Details page for any restrictions for this subject

CHEM 9005 Higher Degree Research Thesis - Forensics (10,20 Credit Points)
Subject Details (https://hbook.westernsydney.edu.au/subject-details/chem9005/) **Legacy Code:** 800158
Level: PhD and Research Masters Level 9 subject
Restrictions: Please see the Subject Details page for any restrictions for this subject