



BRIDGING TO CHEMISTRY FOR CONSERVATION

A DISTANCE STUDY COURSE

COURSE INSTRUCTOR: DR CHRISTIAN DREYER
DURATION: 4 MONTHS (*recommended*)



THE SOUTH AFRICAN INSTITUTE FOR HERITAGE SCIENCE & CONSERVATION

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The course covers the themes indicated below. Each theme is subdivided into units and sub-units, as indicated.

Theme	Units	Sub-units
Particles and bonding	Atomic structure and ion formation	<ul style="list-style-type: none"> The nucleus of an atom Isotopes Electron configurations Ion formation
	The Periodic Table	
	Chemical bonding and related physical properties	<ul style="list-style-type: none"> Covalent bonds Ionic bonds Metallic bonds
	Electronegativity and intermolecular forces	<ul style="list-style-type: none"> Electronegativity, polar and nonpolar covalent bonds Polar and nonpolar molecules Intermolecular forces
The mole concept and stoichiometry	Balanced equations for chemical reactions	
	The mole concept	
	Stoichiometric calculations	
	Molarity of a solution	
Acids and bases	Acids	<ul style="list-style-type: none"> Formation of hydronium ions Strong and weak acids Ionization of water The pH scale regarding acids Indicators for pH Reactions of acids with metals, metal oxides, metal hydroxides, metal carbonates and ammonia Acidic oxides Acidic buffer solutions
	Bases and alkaline solutions	<ul style="list-style-type: none"> Strong and weak bases The pH scale regarding bases Alkaline buffer solutions Neutralization
	Salt hydrolysis	<ul style="list-style-type: none"> Acidic salt solutions with $\text{pH} < 7$ Nearly neutral salt solutions with pH approximately 7 Alkaline salt solutions with $\text{pH} > 7$
	Acid-base titrations	
Reaction kinetics and equilibrium	Reaction kinetics	<ul style="list-style-type: none"> Reaction mechanism Main factors influencing reaction rate
	Chemical equilibrium	<ul style="list-style-type: none"> Dynamic equilibrium of a reversible reaction in a closed system Equilibrium constant for a dynamic equilibrium
	Le Chatelier's Principle	<ul style="list-style-type: none"> Applied to a change in concentration Applied to a change in pressure Applied to a change of temperature
	Equilibrium in buffer solutions	<ul style="list-style-type: none"> Acidic buffer solutions Alkaline buffer solutions

Theme	Units	Sub-units
Solubility & Precipitation	Dissolution of solids	<ul style="list-style-type: none"> Dissolution of molecular solids Dissolution of ionic salts
	Precipitation	
	The common ion effect	<ul style="list-style-type: none"> A qualitative discussion A quantitative discussion
	Complex ions and solubility	<ul style="list-style-type: none"> The diammine silver (I) ion Increase in the solubility of silver bromide by complex ion formation
Redox Chemistry	Balancing redox reactions by using half reactions	<ul style="list-style-type: none"> The net ionic equation for a redox reaction Basic terms regarding redox chemistry Balancing a redox reaction taking place in an acidic medium
	Spontaneous and non-spontaneous redox reactions	
	Electrochemical cells which release energy	<ul style="list-style-type: none"> The zinc copper cell The use of the standard hydrogen electrode as reference electrode
	Electrolysis and electroplating	
Basic Organic Chemistry	Hydrocarbons	<ul style="list-style-type: none"> Alkanes as saturated hydrocarbons Saturated cyclic compounds Unsaturated hydrocarbons Unsaturated cyclic compounds
	Halogenated compounds	
	Oxygenated compounds	<ul style="list-style-type: none"> Alcohols Ethers Carbonyl compounds Carboxylic acids Esters
	Nitrogen containing compounds	

EACH of this course's themes includes the following:

1. an introduction which includes outcomes for the theme
2. study material for each of the units into which the theme is subdivided
3. a number of projects which the student needs to complete and submit
4. an online test, in which a mark of 60% must be attained in order to pass

The majority of the projects (*point 3.*) will entail questions / problems to which the student must provide the answers, followed by tutor feedback on such answers - provided to the student shortly after the respective submissions. Some projects may include a practical component for which a parcel (containing apparatus and chemicals) will be mailed to the student.

COURSE DETAILS

Enrolment prerequisites: None

Starting date: Registration open throughout the year

Course duration: 4 months (recommended maximum)

Course fee: R9 750,00 (VAT Exempt)

Chemistry kit: R785,00 (excl. VAT, packaging, and shipping)

Please enquire about the availability of part-bursaries.

Certificate of attainment & scored Course Report follow completion.

(Both hard copy and digital versions are furnished)

