

DIPLOMA IN ANALYTICAL CHEMISTRY

Qualification code: DPAC19 - NQF Level 6 (360 credits)

SAQA ID: 100979, CHE NUMBER: H16/14303/HEQSF

Campus where offered: Arcadia Campus

REMARKS

a. Admission requirement(s) and selection criteria:

• FOR APPLICANTS WHO OBTAINED A SENIOR CERTIFICATE BEFORE 2008:

Admission requirement(s):

A Senior Certificate or an equivalent qualification, with a D symbol at Higher Grade or a C symbol at Standard Grade for English, Mathematics and Physical Science.

Selection criteria:

Applicants are selected by means of the following formula for academic merit, based on scholastic performance:

SYMBOL	HG VALUE	SG VALUE
A	8	7
B	7	6
C	6	5
D	4	3
E	2	1

To be considered for this qualification, applicants must have a score of at least **24** according to the table above.

- Applicants with a score of 30 and more according to the formula for academic merit determination will be considered for admission.
- Applicants with a score of 24 to 29 according to the formula for academic merit determination will be kept on a waiting list from which the applicants with the highest scores will be selected. Waiting lists will be cleared at the end of September.

• FOR APPLICANTS WHO OBTAINED A NATIONAL SENIOR CERTIFICATE IN OR AFTER 2008:

Admission requirement(s):

A National Senior Certificate with a bachelor's degree or a diploma endorsement, or an equivalent qualification, with an achievement level of at least 4 for English (home language or first additional language), 4 for Mathematics and 4 for Physical Sciences.

Selection criteria:

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **21**.

Assessment procedures:

- Applicants with a score of 27 and more will be considered for admission.
- Applicants with a score of 21 to 26 will be kept on a waiting list from which the applicants with the highest scores will be selected. Waiting lists will be cleared at the end of September.

• FOR APPLICANTS WITH A NATIONAL CERTIFICATE (VOCATIONAL):

Admission requirement(s):

A National Certificate (Vocational) with a bachelor's degree or a diploma endorsement, with at least 50% for English (home language or first additional language) and 50% for Mathematics, 50% for Life Orientation (excluded for APS calculation), 60% for Physical Sciences, 60% in any two compulsory vocational subjects, and 50% for the fourth subject.



Selection criteria:

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **24**.

Assessment procedures:

- Applicants with a score of 28 and more will be considered for admission.
 - Applicants with a score of 24 to 27 will be kept on a waiting list from which the applicants with the highest scores will be selected. Waiting lists will be cleared at the end of September.
- b. *Minimum duration:*
Three years.
- c. *Presentation:*
Day classes.
- d. *Intake for the qualification:*
January only.
- e. *Exclusion and readmission:*
See Chapter 2 of Students' Rules and Regulations.
- f. *Recognition of Prior Learning (RPL), equivalence and status:*
See Chapter 30 of Students' Rules and Regulations.
- g. *Practicals:*
It is compulsory for students to attend 100% of the practical classes. Students must pass the practical component of a module to be admitted to the examination.
- h. *Textbooks:*
Textbooks and other educational material will be required.
- i. *Personal protective equipment:*
Specific safety wear is compulsory (where applicable), and students must purchase it themselves.
- j. *WIL in Analytical Chemistry I:*
See Chapter 5 of Students' Rules and Regulations.
- k. *Module credits:*
Module credits are shown in brackets after each module.

CURRICULUM

FIRST YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
ACH105D	Analytical Chemistry I	(5)	(24)	
CAP105X	Communication for Academic Purposes	(5)	(10)	
CHM105D	Chemistry I	(5)	(24)	
CPL105X	Computer Literacy	(5)	(10)	
INI125D	Information Literacy I (block module)	(5)	(2)	
LFI125X	Life Skills I (block module)	(5)	(2)	
MAT105D	Mathematics I	(5)	(24)	
PHI105D	Physics I	(5)	(24)	
TOTAL CREDITS FOR THE FIRST YEAR:			120	



SECOND YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
FIRST SEMESTER				
EVC216D	Environmental Chemistry I	(6)	(12)	Analytical Chemistry I Chemistry I
INA216D	Inorganic Chemistry IIA	(6)	(12)	Chemistry I
OCA216D	Organic Chemistry IIA	(6)	(12)	Chemistry I
PCA216D	Physical Chemistry IIA	(6)	(12)	Chemistry I Mathematics I
TOTAL CREDITS FOR THE SEMESTER:			48	
SECOND SEMESTER				
INB216D	Inorganic Chemistry IIB	(6)	(18)	Inorganic Chemistry IIA
MSP216D	Molecular Spectroscopy I	(6)	(18)	Inorganic Chemistry IIA Organic Chemistry IIA Physical Chemistry IIA
OCB216D	Organic Chemistry IIB	(6)	(18)	Organic Chemistry IIA
PCB216D	Physical Chemistry IIB	(6)	(18)	Physical Chemistry IIA
TOTAL CREDITS FOR THE SEMESTER:			72	
TOTAL CREDITS FOR THE SECOND YEAR:			120	

THIRD YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
FIRST SEMESTER				
ASP316D	Atomic Spectroscopy III	(6)	(18)	Analytical Chemistry I
CQA316D	Chemical Quality Assurance III	(6)	(12)	Analytical Chemistry I
CTG316D	Chromatography III	(6)	(18)	Analytical Chemistry I
ELC316D	Electrochemistry III	(6)	(12)	Analytical Chemistry I
TOTAL CREDITS FOR THE SEMESTER:			60	
SECOND SEMESTER				
On completion of all the modules from the first- and second year.				
WAC316D	WIL in Analytical Chemistry I	(6)	(60)	
TOTAL CREDITS FOR THE SEMESTER:			60	
TOTAL CREDITS FOR THE THIRD YEAR:			120	
TOTAL CREDITS FOR THE QUALIFICATION:			360	



MODULE INFORMATION (OVERVIEW OF SYLLABUS)

The syllabus content is subject to change to accommodate industry changes. Please note that a more detailed syllabus is available at the Department or in the study guide that is applicable to a particular module. On 01 August 2018, the syllabus content was defined as follows:

A

ANALYTICAL CHEMISTRY I (ACH105D) **1 X 3-HOUR PAPER**
(Module custodian: Department of Chemistry)
Chemicals, Apparatus and Unit Conversions. Calculations used in Analytical Chemistry. Titrimetric methods. Gravimetric methods. Aqueous solutions and Chemical Equilibria. Statistical methods. (Total tuition time: ± 240 hours)

ATOMIC SPECTROSCOPY III (ASP316D) **1 X 3-HOUR PAPER**
(Module custodian: Department of Chemistry)
Introduction to Atomic Spectroscopy. Standardisation and Calibration. Signals and Noise. Atomic Absorption Spectrometry. Atomic Emission Spectrometry. Atomic X-ray Spectrometry. (Total tuition time: ± 180 hours)

C

CHEMICAL QUALITY ASSURANCE III (CQA316D) **1 X 3-HOUR PAPER**
(Module custodian: Department of Chemistry)
Introduction to Chemical Quality Assurance. Sampling methods. Validation of Analytical methods. Statistics in Analytical Chemistry. Quality Control Techniques. Documents for Quality Assurance. Organising, auditing and Standard Operating Procedures. Laboratory facilities and Information Management Systems. International standards and Laboratory Accreditation. (Total tuition time: ± 120 hours)

CHEMISTRY I (CHM105D) **1 X 3-HOUR PAPER**
(Module custodian: Department of Chemistry)
The role and importance of chemistry in everyday life. Classification and properties of matter. Units of measurement. Atoms, molecules and ions. The modern view of atomic structure and the use of electron configurations in chemical bonding. The periodic table of elements. The use of IUPAC rules for naming inorganic compounds. Application of the mole concept in stoichiometric calculations. Reactions in aqueous solutions. Chemical equilibrium. Fundamental concepts in electrochemistry. Organic nomenclature. (Total tuition time: ± 240 hours)

CHROMATOGRAPHY III (CTG316D) **1 X 3-HOUR PAPER**
(Module custodian: Department of Chemistry)
Principles of chromatography. Classification of chromatographic methods. Van Deemter equation and the application thereof. Optimisation of column performance. Applications of chromatography. Gas and liquid chromatography instrumentation. Planar chromatography. (Total tuition time: ± 180 hours)

COMMUNICATION FOR ACADEMIC PURPOSES (CAP105X) **1 X 3-HOUR PAPER**
(Module custodian: Department of Applied Languages)
A workable knowledge of English is an essential skill for any graduate who is required to conduct themselves successfully in a professional working environment. This module will equip students with the competencies required to compose a selection of written texts related to communicating both internally and externally within a professional environment. In addition, the module includes strategies that are essential for the effective communication in various situations, including small groups to avoid unproductive conflict, a multicultural context, etc. (Total tuition time: not available)

COMPUTER LITERACY (CPL105X) **CONTINUOUS ASSESSMENT**
(Module custodian: End User Computing Unit)
Introduction of information literacy. Development of a search strategy and application of a search string to search engines and academic databases. Evaluation of information sources. Ethical and legal use of information. (Total tuition time: not available)



E**ELECTROCHEMISTRY III (ELC316D)****1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

Introduction to electroanalytical methods. Potentiometry. Conductimetry. Fundamentals and functioning of electrochemical cells. Galvanic and electrolytic cells. Reference and indicator electrodes. (Total tuition time: ± 120 hours)

ENVIRONMENTAL CHEMISTRY I (EVC216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

Chemical fate and transport. Aquatic Chemistry. Oxidation-Reduction in Aquatic Chemistry. Phase Interactions in Aquatic Chemistry. Aquatic Microbial Chemistry. Water Pollution. Water Treatment. Chemical Analysis of Water and Wastewater. (Total tuition time: ± 120 hours)

I**INFORMATION LITERACY I (INI125D)****CONTINUOUS ASSESSMENT****(Module custodian: Directorate of Library and Information Services)**

Introduction of information literacy. Development of a search strategy and application of a search string to search engines and academic databases. Evaluation of information sources. Ethical and legal use of information. (Total tuition time: not available)

INORGANIC CHEMISTRY IIA (INA216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

Covalent and metallic bonding. Ionic Bonding. Solvent systems and acid-base behaviour. Redox Chemistry. Hydrogen and some of its compounds. Alkali metals and their compounds. Alkali earth metals and their compounds. Boron and aluminum and their compounds. Carbon and silicon and their compounds. Nitrogen and phosphorous and their compounds. Oxygen and sulphur and their compounds. The Halogens and their compounds. (Total tuition time: ± 120 hours)

INORGANIC CHEMISTRY IIB (INB216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

The Lewis electron-dot structures. Formal charges. The Valence Shell Electron Pair Repulsion Theory. The Valence Bond Theory. The Molecular Orbital Theory. Coordination numbers and geometries. Types of ligands. Nomenclature. Isomers. Crystal field splitting. Distortion of complexes. Properties of the d-block elements. Titanium; Vanadium; Chromium; Manganese; Iron; Cobalt; Nickel; Copper; Silver; Gold; Zinc; Cadmium; Mercury. (Total tuition time: ± 180 hours)

L**LIFE SKILLS I (LFI125X)****CONTINUOUS ASSESSMENT****(Module custodian: Directorate of Student Development and Support)**

Academic, personal and socio-emotional skills development for students in higher education. Personal and social dimensions address: effective planning and self-management (goal setting and time management); Adjusting to university life (student life, diversity and change); Intra- and interpersonal skills development (conflict management, self-esteem, relationship management); Effective living (healthy living, HIV education, substance abuse); Academic dimension addresses: academic skills for university (e.g. critical thinking, creativity, managing assignments and assessments). (Total tuition time: not available)

M**MATHEMATICS I (MAT105D)****1 X 3-HOUR PAPER****(Module custodian: Department of Mathematics and Statistics)**

Consolidation of existing knowledge of and introduction to new types of functions; solution of systems of equations using matrices; introduction to vector algebra and complex numbers; application of differentiation and integration to solve well-defined problems. (Total tuition time: ± 120 hours)



MOLECULAR SPECTROSCOPY I (MSP216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

Electromagnetic radiation and its interaction with matter. Quantized energy levels and introductory spectroscopy. UV/VIS spectrophotometry. Beer-Lambert law. Infrared spectroscopy. Mass spectroscopy. Nuclear Magnetic Resonance Spectroscopy. (Total tuition time: ± 120 hours)

O**ORGANIC CHEMISTRY IIA (OCA216D)****1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

Naming of Organic compounds according to IUPAC rules. Stereochemistry of organic compounds. Structure and reactivity of: Alkanes and cycloalkanes, Alkenes and Alkynes, Aromatic Compounds, Alkyl halides, Alcohols, Ethers and Epoxides, Aldehydes and ketones, Carboxylic acids and their derivatives, Amines. (Total tuition time: ± 120 hours)

ORGANIC CHEMISTRY IIB (OCB216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

Electrophilic aromatic substitution reactions. Nucleophilic aromatic substitution reactions. Carbonyl nucleophilic addition reactions. Alpha- substitution reactions. Carbonyl condensation reactions. Biomolecules. (Total tuition time: ± 180 hours)

P**PHYSICAL CHEMISTRY IIA (PCA216D)****1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

States of Matter, gas laws and kinetic model of gases. Molecular speeds, kinetic energy, pressure, temperature, volumes and amount of substance. Unit Conversions. Calculations used in Physical Chemistry. Intermolecular forces, vapour pressure, boiling and melting points of substances. Surface Tension, Viscosity and Capillarity. Concentration of solutions. Vapor pressure difference, boiling point elevation, melting point depression and Osmotic pressure. Phase diagram and Phase changes. Colloids. Chemical Kinetics. Chemical Equilibria. Chemical Thermodynamics. (Total tuition time: ± 120 hours)

PHYSICAL CHEMISTRY IIB (PCB216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Chemistry)**

Chemical Thermodynamics. Phase Changes. Electrochemistry. Chemical Kinetics. Quantum Chemistry Surface Chemistry. (Total tuition time: ± 180 hours)

PHYSICS I (PHI105D)**1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Basic Mathematical Concepts for Physics and measurements. Kinematics in one dimension. Kinematics in a plane (projectile motion). Forces and Newton's Laws of Motion. Momentum and Impulse. Work, Energy and Power. Rotational Kinematics. Rotational Dynamics. Elasticity. Static and dynamic fluids. Temperature and 0th Law of Thermodynamics. Thermal Expansion and Thermal Stress. 1st Law of Thermodynamics. Heat transfer. Gas Laws. General properties of waves. Reflection. Refraction. Interference and Diffraction of waves. Electrostatics. Electric Potential Energy and Potential Difference. Electric Circuits. (Total tuition time: ± 240 hours)

W**WIL IN ANALYTICAL CHEMISTRY I (WAC316D)****WORK-INTEGRATED LEARNING****(Module custodian: Department of Chemistry)**

Introduction to WIL. Work-place learning including: Laboratory organisation and management, Sampling and sample handling, volumetric analysis, gravimetric analysis, instrumental analysis. Quality management. Reporting results. WIL reflection. (Total tuition time: ± 600 hours)

