



	Curriculum Document			
Curriculum Code	Curriculum Title		Logo	
311101001	Chemical Laboratory Analyst			
	Name	Email	Phone	Logo
Development Quality Partner	CHIETA	info@CHIETA.org.za	011 628 7000	

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SECTION 1: CURRICULUM SUMMARY

1. Occupational Information

1.1 Associated Occupation

311101: Chemistry Technician

1.2 Occupation or Specialisation Addressed by this Curriculum

311101001: Chemical Laboratory Analyst

1.3 Alternative Titles used by Industry

- Laboratory Analyst

2. Curriculum Information

2.1 Curriculum Structure

This qualification is made up of the following compulsory Knowledge and Practical Skill Modules:

Knowledge Modules:

- 311101001-KM-01, Fundamentals of Sampling and Sampling Preparation, NQF Level 2, Credits 6
- 311101001-KM-02, Introduction to Analytical Chemistry, NQF Level 3, Credits 11
- 311101001-KM-03, Theory of Fire Assay, NQF Level 3, Credits 6
- 311101001-KM-04, Applied mathematics, science and physics for chemical laboratory analyst, NQF Level 4, Credits 16
- 311101001-KM-05, Analytical Chemistry, NQF Level 4, Credits 30

Total number of credits for Knowledge Modules: 69

Practical Skill Modules:

- 311101001-PM-01, Collect a range of samples, NQF Level 2, Credits 7
- 311101001-PM-02, Execute primary and secondary sample preparation as required for the relevant analytical processes (Such as: Tipping, crushing, drying, splitting, pulverizing, milling, Flux preparation, fluxing, fusion, cupellation), NQF Level 2, Credits 8
- 311101001-PM-03, Analyse samples in a chemical laboratory using basic analytical methods and equipment, NQF Level 3, Credits 20
- 311101001-PM-04, Analyse samples in a chemical laboratory applying advanced analytical procedures and using complex equipment., NQF Level 4, Credits 24

Total number of credits for Practical Skill Modules: 59

This qualification also requires the following Work Experience Modules:

- 311101001-WM-01, Exposed to the processes of sample collection for a specific industry, NQF Level 2, Credits 8

- 311101001-WM-02, Exposure to the processes of sample preparation as applied within the specific work environment (such as Fire Assay processes), NQF Level 2, Credits 16
- 311101001-WM-03, Exposure to the basic analysis of laboratory samples, NQF Level 3, Credits 16
- 311101001-WM-04, Exposure to the processes of advanced sample analysis in a chemical laboratory, NQF Level 4, Credits 32

Total number of credits for Work Experience Modules: 72

2.2 Entry Requirements

NQF level 3

3. Assessment Quality Partner Information

Name of body: CHIETA

Address of body: 2 Clamart Road Richmond 2092

Contact person name: ETQA Manager

Contact person work telephone number: 011 628 7000

4. Part Qualification Curriculum Structure

Part Qualification 1:

Title:

Chemical Laboratory Assistant, NQF Level 2, Credits 35

Purpose:

Collect and prepare samples and execute support duties in order to facilitate the analysis of samples in a chemical laboratory

Applicable Modules (Rules of Combination)

Knowledge Modules:

- 311101001-KM-01, Fundamentals of Sampling and Sampling Preparation, NQF Level 2, Credits 6

Total number of credits for Knowledge Modules: 6

Practical Skill Modules:

- 311101001-PM-01, Collect a range of samples, NQF Level 2, Credits 7
- 311101001-PM-02, Execute primary and secondary sample preparation as required for the relevant analytical processes (Such as: Tipping, crushing, drying, splitting, pulverizing, milling, Flux preparation, fluxing, fusion, cupellation), NQF Level 2, Credits 8

Total number of credits for Practical Skill Modules: 15

This qualification also requires the following Work Experience Modules:

- 311101001-WM-01, Exposed to the processes of sample collection for a specific industry, NQF Level 2, Credits 8

- 311101001-WM-02, Exposure to the processes of sample preparation as applied within the specific work environment (such as Fire Assay processes), NQF Level 2, Credits 16

Total number of credits for Work Experience Modules: 24

Assessment Qualification Standards:

- Take samples for specific operational processes
- Prepare samples for analysis

Part Qualification 2:

Title:

Fire Assayer, NQF Level 3, Credits 28

Purpose:

To Prepare precious metal prills for analysis

Applicable Modules (Rules of Combination)

Knowledge Modules:

- 311101001-KM-01, Fundamentals of Sampling and Sampling Preparation, NQF Level 2, Credits 6
- 311101001-KM-03, Theory of Fire Assay, NQF Level 3, Credits 6

Total number of credits for Knowledge Modules: 12

Practical Skill Modules:

- 311101001-PM-02, Execute primary and secondary sample preparation as required for the relevant analytical processes (Such as: Tipping, crushing, drying, splitting, pulverizing, milling, Flux preparation, fluxing, fusion, cupellation), NQF Level 2, Credits 8

Total number of credits for Practical Skill Modules: 8

This qualification also requires the following Work Experience Modules:

- 311101001-WM-02, Exposure to the processes of sample preparation as applied within the specific work environment (such as Fire Assay processes), NQF Level 2, Credits 16

Total number of credits for Work Experience Modules: 16

Assessment Qualification Standards:

- Prepare samples for analysis

SECTION 2: OCCUPATIONAL PROFILE

1. Occupational Purpose

Perform chemical and physical analyses of samples to pre-defined standards, in support of operational processes

2. Occupational Tasks

- Take samples for specific operational processes (NQF Level 2)
- Prepare samples for analysis (NQF Level 2)
- Analyse samples in a chemical laboratory by applying basic analytical methods and equipment (NQF Level 3)
- Analyse samples in a chemical laboratory by applying advanced analytical processes and using complex equipment (NQF Level 4)

3. Occupational Task Details

3.1. Take samples for specific operational processes (NQF Level 2)

Unique Product or Service:

All required samples available and representative for analysis

Occupational Responsibilities:

- Collect a range of samples

Occupational Contexts:

- Exposed to the processes of sample collection for a specific industry

3.2. Prepare samples for analysis (NQF Level 2)

Unique Product or Service:

Homogeneous samples available for analysis

Occupational Responsibilities:

- Execute primary and secondary sample preparation as required for the relevant analytical processes (Such as: Tipping, crushing, drying, splitting, pulverizing, milling, Flux preparation, fluxing, fusion, and cupellation)

Occupational Contexts:

- Exposure to the processes of sample preparation as applied within the specific work environment (such as Fire Assay processes)

3.3. Analyse samples in a chemical laboratory by applying basic analytical methods and equipment (NQF Level 3)

Unique Product or Service:

Basic analytical methods are applied

Occupational Responsibilities:

- Analyse samples in a chemical laboratory using basic analytical methods and equipment

Occupational Contexts:

- Exposure to the basic analysis of laboratory samples

3.4. Analyse samples in a chemical laboratory by applying advanced analytical processes and using complex equipment (NQF Level 4)

Unique Product or Service:

Advanced analytical processes are applied

Occupational Responsibilities:

- Analyse samples in a chemical laboratory applying advanced analytical procedures and using complex equipment

Occupational Contexts:

- Exposure to the processes of advanced sample analysis in a chemical laboratory

SECTION 3: CURRICULUM COMPONENT SPECIFICATIONS

SECTION 3A: KNOWLEDGE MODULE SPECIFICATIONS

List of Knowledge Modules for which Specifications are included

- 311101001-KM-01, Fundamentals of Sampling and Sampling Preparation, NQF Level 2, Credits 6
- 311101001-KM-02, Introduction to Analytical Chemistry, NQF Level 3, Credits 11
- 311101001-KM-03, Theory of Fire Assay, NQF Level 3, Credits 6
- 311101001-KM-04, Applied mathematics, science and physics for chemical laboratory analyst, NQF Level 4, Credits 16
- 311101001-KM-05, Analytical Chemistry, NQF Level 4, Credits 30

1. 311101001-KM-01, Fundamentals of Sampling and Sampling Preparation, NQF Level 2, Credits 6

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the fundamental concepts and principles of sampling and sampling preparation. Learners will be expected to gain a broad understanding of this theoretical base and will use this knowledge as the underpinning theory and principles when executing the practical tasks of sampling and sample preparation.

The learning will enable learners to demonstrate an understanding of:

- KM-01-KT01: Principles of sampling (Intermediate). (16%)
- KM-01-KT02: Fundamental chemical theory associated with sample preparation (12%)
- KM-01-KT03: Principles of hazard awareness and identification (intermediate) (12%)
- KM-01-KT04: Principles of sample handling (storage and transportation) (Basic) (12%)
- KM-01-KT05: Application of specific units of measurement (Intermediate) (12%)
- KM-01-KT06: Theoretical principles of sample preparation (Intermediate) (12%)
- KM-01-KT07: Scientific terminologies associated with sample preparation (Basic) (Such as: moisture, density, particle size distribution, waste content etc) (12%)
- KM-01-KT08: Critical role of sampling within the overall business process (Up and down stream) (12%)

1.2 Guidelines for Topics

1.2.1. KM-01-KT01: Principles of sampling (Intermediate). (16%)

Topic elements to be covered include:

- KT0101 Explain what is meant by representative sampling
- KT0102 Explain what is meant by a sampling plan and give examples of how such a plan is implemented in your workplace
- KT0103 Describe what sampling is and why it is important to take quality samples
- KT0104 Describe the different types of samples that are taken (Slurry, Production Samples, Raw Material samples, Product Samples, Environmental, Quality Control);
- KT0105 Explain the concept of sample size and give examples of how sample size is determined within a laboratory;
- KT0106 Explain how to deal with sampling errors
- KT0107 List and explain the fundamental of various Sampling techniques used to sample solids, liquids and gases
- KT0108 List and explain primary sample preparation (such as splitting, milling, crushing, drying, weighing, mixing etc.) for analysis including preparation of solids, liquid samples;
- KT0109 Identify and describe the purpose of the main types of equipment used for sampling and sample preparation;

- KT0110 Explain the concept of Sample quality (such as: labelling, traceability, receiving, handling, storage, transportation, preparation, representative sampling, contamination)
- KT0111 Describe the occupational safety, health, environment and security Risk aspects associated with Sampling and sample preparation.

Internal Assessment Criteria and Weight

- IAC0101 Given a range of questions and possible answers relating to the basics of sampling and sample preparation learners will be able to select the correct answers and explain the reasons for their selection.

(Weight 16%)

1.2.2. KM-01-KT02: Fundamental chemical theory associated with sample preparation (12%)

Topic elements to be covered include:

- KT0201 Explain the basic concepts and principles of dilution;
- KT0202 Explain the basic concepts and principles of fusion;
- KT0203 Explain the basic concepts and principles of dissolution
- KT0204 Explain the basic concepts and principles of separation
- KT0205 Explain the basic concepts and principles of press pellet preparation

Internal Assessment Criteria and Weight

- IAC0201 Given a range of questions and possible answers relating to the purpose and importance of sampling and sample preparation learners will be able to select the correct answers and explain the reasons for their selection.

(Weight 12%)

1.2.3. KM-01-KT03: Principles of hazard awareness and identification (intermediate) (12%)

Topic elements to be covered include:

- KT0301 Explain what a material safety data sheet is and give examples of how to use these sheets;
- KT0302 Use standard operating procedures to identify the hazards and risks associated with various samples;
- KT0303 Identify and give practical examples of the general hazards and risks associated with working in a laboratory environment;
- KT0304 Describe the preventative and contingency actions required to deal with hazards and risks in a laboratory environment;
- KT0305 Explain the interrelationship between Occupational Health and safety and good housekeeping;
- KT0306 Describe the importance of ensuring a healthy environment and give examples of the consequences of environmental pollution for the community and the organisation;

- KT0307 Identify the different types of pollution within work environment and describe the preventative actions that must be taken;
- KT0308 Describe the processes for disposing of various types of samples and laboratory consumables.

Internal Assessment Criteria and Weight

(Weight 12%)

1.2.4. KM-01-KT04: Principles of sample handling (storage and transportation) (Basic) (12%)

Topic elements to be covered include:

- KT0401 Explain the importance of proper handling and storing of samples (Sample traceability);
- KT0402 Explain the concept of deterioration of samples and give examples of actions required to prevent it. (Life span, exposure to the elements, temperature etc);
- KT0403 Describe what is meant by the properties of samples and give examples of why it is important know the properties of the samples that you work with (How samples with different properties must be handled);
- KT0404 Explain the difference between samples and the standards - need to avoid contamination;
- KT0405 Describe the typical security and legal aspects associated with sampling and sample preparation

Internal Assessment Criteria and Weight

(Weight 12%)

1.2.5. KM-01-KT05: Application of specific units of measurement (Intermediate) (12%)

Topic elements to be covered include:

- KT0501 Explain the meaning of the various units of measurement (Such as: Volume, Mass, temperature, time, and dimensions);
- KT0502 Give examples of the application of the various units of measurement within a laboratory environment;
- KT0503 Explain the implications of non-adherence to the measurement requirements when preparing samples;
- KT0504 Conduct basic conversions of the various units of measurements.

Internal Assessment Criteria and Weight

(Weight 12%)

1.2.6. KM-01-KT06: Theoretical principles of sample preparation (Intermediate) (12%)

Topic elements to be covered include:

- KT0601 Identify and describe the typical sample preparation process flow;
- KT0602 Explain the impact of proper housekeeping and equipment handling and care on effective sample preparation;
- KT0603 Describe the fundamental operating procedures for the various categories of equipment used in the sample preparation process;
- KT0604 Describe the impact of effective record keeping within the sample preparation process;
- KT0605 Identify and describe the purpose of various chemicals within the sample preparation process;
- KT0606 Explain the concept of quality assurance within the sample preparation process and give examples of the impact of not applying the quality processes properly (Equipment functionality, control samples, standards);
- KT0607 Explain the concept of homogeneity and describe the basic processes for ensuring homogeneity;
- KT0608 Describe the difference between accuracy and precision and the impact of this within the sample preparation environment;
- KT0609 Identify the typical problems encountered in the sample preparation process and indicate how these problems must be resolved.

Internal Assessment Criteria and Weight

(Weight 12%)

1.2.7. KM-01-KT07: Scientific terminologies associated with sample preparation (Basic) (Such as: moisture, density, particle size distribution, waste content etc) (12%)

Topic elements to be covered include:

- KT0701 Explain the meaning of the specific terms and give examples of how they are used in a laboratory;
- KT0702 Describe the fundamental processes of determining sample content (Such as: Moisture, density, particle size distribution);
- KT0703 Identify the basic units of measurements related to the sample preparation process.

Internal Assessment Criteria and Weight

(Weight 12%)

1.2.8. KM-01-KT08: Critical role of sampling within the overall business process (Up and down stream) (12%)

Topic elements to be covered include:

- KT0801 Explain why sampling and sample preparation is important within any organisation (Monitoring and evaluation);
- KT0802 Give examples of the role of sampling and sample preparation with your organisation.

Internal Assessment Criteria and Weight

(Weight 12%)

1.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - f. Equipment to demonstrate basic instrumental analysis techniques at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years' experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

1.4 Exemptions

2. 311101001-KM-02, Introduction to Analytical Chemistry, NQF Level 3, Credits 11

2.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory required to understand the use of laboratory equipment and the elementary principles of basic analytical methods used for chemical and physical analysis of samples received.

The learning will enable learners to demonstrate an understanding of:

- KM-02-KT01: Introduction to Analytical Chemistry (15%)
- KM-02-KT02: Concepts of physical analytical methods and instruments (25%)
- KM-02-KT03: Concepts of pH measurement (6%)
- KM-02-KT04: Concepts of ion-selective measurement (6%)
- KM-02-KT05: Concepts of conductivity measurements (12%)
- KM-02-KT06: Concepts of gravimetric methods (12%)
- KM-02-KT07: Concepts of titrimetric methods (12%)
- KM-02-KT08: Concepts of Potentiometric methods (12%)

2.2 Guidelines for Topics

2.2.1. KM-02-KT01: Introduction to Analytical Chemistry (15%)

Topic elements to be covered include:

- KT0101 Explain why analysis is done within a production/manufacturing process
- KT0102 Identify and give practical examples to illustrate the consequences of incorrect reporting of results;
- KT0103 Describe the typical sequence of events within an analytical laboratory;
- KT0104 Discuss the generic skills, competencies and attributes required for working in an analytical laboratory;
- KT0105 Explain the generic occupational, health, environmental and safety aspects associated with work in an analytical laboratory.

Internal Assessment Criteria and Weight

- IAC0101 $\hat{\square}$ Given a set of questions and possible answers relating to the role and function of analytical processes within industry, learners will be able to correctly identify the correct answers and explain the reasons for their answers giving practical examples from their own work environment.

(Weight 15%)

2.2.2. KM-02-KT02: Concepts of physical analytical methods and instruments (25%)

Topic elements to be covered include:

- KT0201 Explain what physical analytical methods are and indicate where these methods may be applied (Such as: Particle size analysis, density, determining physical properties of materials, strength testing etc.);
- KT0202 Identify what equipment is appropriate for the correct application of physical analytical methods;
- KT0203 Identify and describe the Principal Components and primary functions of equipment used in physical analysis for solids, liquids and gases;
- KT0204 Give practical examples of the factors (Such as: Temperature, moisture, contamination etc.) that could influence the accuracy of physical analytical measurements for solids, liquids and gases;
- KT0205 Identify and describe the importance of physical analytical measurement for an operation;
- KT0206 Give practical examples of the consequences of incorrectly reported physical analysis measurements;
- KT0207 Describe what calibration is, why it is done and who should do it for the different types of physical analysis equipment;
- KT0208 Explain the difference between calibration and validation;
- KT0209 Explain the basic principles of the care and maintenance of equipment and indicate who is responsible for this function in a laboratory (Calibration and care of equipment used in physical analysis);
- KT0210 Identify and describe common problems that could occur when conducting physical analytical measurements (Common problems with and responses to physical analytical methods for solids, liquids and gases);
- KT0211 Describe the occupational safety, health, environment and security Risk aspects associated with the application of physical analytical measurements.

Internal Assessment Criteria and Weight

- IAC0201 Recognise components of laboratory equipment used in the physical analysis of samples from diagrams and describe their function
- IAC0202 List the standards that must be met to ensure accurate analytical results and describe the steps to ensure this

(Weight 25%)

2.2.3. KM-02-KT03: Concepts of pH measurement (6%)

Topic elements to be covered include:

- KT0301 Describe pH in terms of acidity and alkalinity;
- KT0302 Describe the various methods for the measurement of pH;
- KT0303 Identify and describe the principle component parts of a pH meter;
- KT0304 Principal Components and primary functions of pH measurement equipment;

- KT0305 Identify the key Factors (such as: temperature, nature of the sample, contamination etc.) influencing pH measurements and explain how these factors will influence the measurement;
- KT0306 Explain the Importance of pH measurements and give examples of how this is used in industry;
- KT0307 Explain how to calibrate and care for pH measuring equipment Calibration and care of pH measurement equipment
- KT0308 Give practical examples of the consequences of reporting an incorrect pH measurement.

Internal Assessment Criteria and Weight

- IAC0301 Demonstrate an understanding of pH measurement techniques and equipment
- IAC0302 Explain the calibration and care of pH measurement equipment
- IAC0303 Demonstrate an understanding of common problems with and responses to pH measurements

(Weight 6%)

2.2.4. KM-02-KT04: Concepts of ion-selective measurement (6%)

Topic elements to be covered include:

- KT0401 Identify and describe the principal components and primary functions of ion-selective measurement equipment;
- KT0402 Describe the factors influencing ion-selective measurements;
- KT0403 Describe the Importance and applications of ion-selective measurements
- KT0404 Explain the processes and responsibilities for the calibration and care of ion-selective measurement equipment
- KT0405 Identify and describe the common causes of problems with and responses to ion-selective measurements.

Internal Assessment Criteria and Weight

- IAC0401 Demonstrate an understanding of ion-selective measurement techniques and equipment;
- IAC0402 Explain the calibration and care of ion-selective measurement equipment;
- IAC0403 Demonstrate an understanding of common problems with and responses to ion-selective measurements.

(Weight 6%)

2.2.5. KM-02-KT05: Concepts of conductivity measurements (12%)

Topic elements to be covered include:

- KT0501 Principal Components and primary functions of conductivity measurement equipment;

- KT0502 Factors influencing conductivity measurements;
- KT0503 Importance and applications of conductivity measurements;
- KT0504 Calibration and care of conductivity measurement equipment;
- KT0505 Common problems with and responses to conductivity measurements.

Internal Assessment Criteria and Weight

- IAC0501 Demonstrate an understanding of conductivity measurement techniques and equipment;
- IAC0502 Explain the calibration and care of conductivity measurement equipment;
- IAC0503 Demonstrate an understanding of common problems with and responses to conductivity measurements.

(Weight 12%)

2.2.6. KM-02-KT06: Concepts of gravimetric methods (12%)

Topic elements to be covered include:

- KT0601 Explain what gravimetric methods are and identify the various steps in a gravimetric determination;
- KT0602 Explain the basic Concepts of filtration methods (including principal components and primary functions);
- KT0603 Explain the concepts of evaporation methods (including principal components and primary functions);
- KT0604 Explain the concepts of ignition methods (including principal components);
- KT0605 Give examples of the consequences of poor techniques on the final results of the gravimetric process;
- KT0606 Explain the Concepts of mass determination including the care and maintenance of balances used for mass determination;
- KT0607 Describe fire assay as a gravimetric method.

Internal Assessment Criteria and Weight

- IAC0601 Demonstrate an understanding of filtration methods and equipment;
- IAC0602 Demonstrate an understanding of evaporation methods and equipment;
- IAC0603 Demonstrate an understanding of ignition methods and equipment.

(Weight 12%)

2.2.7. KM-02-KT07: Concepts of titrimetric methods (12%)

Topic elements to be covered include:

- KT0701 Identify and describe the different titrimetric methods (acid-base, REDOX, potentiometric and compleximetric);
- KT0702 Describe the application of the different titration methods;
- KT0703 Identify and describe the application of the specific equipment and apparatus used for each of the titrimetric methods (manual and instrumental);
- KT0704 Identify and describe the influence of the various factors that could impact on each of the titrimetric methods;
- KT0705 Explain the purpose of standardisation for each of the titrimetric methods;
- KT0706 Describe what indicators are and discuss the use of indicators in each of the titrimetric methods. (where they come from and the role of each).

Internal Assessment Criteria and Weight

- IAC0701 Demonstrate an understanding of the various titrimetric measurement techniques and equipment
- IAC0702 Explain the calibration and care of titrimetric measurement equipment
- IAC0703 Demonstrate an understanding of common problems with and responses to titrimetric measurements

(Weight 12%)

2.2.8. KM-02-KT08: Concepts of Potentiometric methods (12%)

Topic elements to be covered include:

- KT0801 Principal Components and primary functions of Potentiometric measurement equipment;
- KT0802 Factors influencing Potentiometric measurements;
- KT0803 Importance and applications of Potentiometric measurements;
- KT0804 Calibration and care of Potentiometric measurement equipment;
- KT0805 Common problems with and responses to Potentiometric measurements;
- KT0806 Selection of Potentiometric titration indicators;
- KT0807 Standardisation of Potentiometric titrants
- KT0808 Health, safety, environmental protective measures (Operational risk).

Internal Assessment Criteria and Weight

- IAC0801 Demonstrate an understanding of Potentiometric measurement techniques and equipment;
- IAC0802 Explain the calibration and care of Potentiometric measurement equipment;
- IAC0803 Demonstrate an understanding of common problems with and responses to Potentiometric measurements.

(Weight 12%)

2.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - f. Equipment to demonstrate basic instrumental analysis techniques – at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years' experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

2.4 Exemptions

3. 311101001-KM-03, Theory of Fire Assay, NQF Level 3, Credits 6

3.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the basic theoretical principles associated with Fire assay as a unique sample preparation methodology.

The learning will enable learners to demonstrate an understanding of:

- KM-03-KT01: The concepts and principles of fire assay (100%)

3.2 Guidelines for Topics

3.2.1. KM-03-KT01: The concepts and principles of fire assay (100%)

Topic elements to be covered include:

- KT0101 Definition and purpose of Fire Assay;
- KT0102 Process and equipment required to do Fire assay (Fluxing, fusion, cupellation)
- KT0103 Fundamental pitfalls associate with the fire assay process and how to avoid them;
- KT0104 Operational risks associated with fire assay;
- KT0105 Theoretical aspects associated with fluxing and the selection of the appropriate fluxes
- KT0106 Theoretical aspects associated with fusion and cupellation

Internal Assessment Criteria and Weight

- IAC0101 Given a set of questions and possible answers relating to the role and application of fire assay within industry, learners will be able to correctly identify the correct answers and explain the reasons for their answers giving practical examples from their own work environment.

(Weight 100%)

3.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;

- f. Equipment to demonstrate basic instrumental analysis techniques – at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
- g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years' experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

3.4 Exemptions

4. 311101001-KM-04, Applied mathematics, science and physics for chemical laboratory analyst, NQF Level 4, Credits 16

4.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the fundamental mathematical concepts and calculations, fundamental physics and science applied when conducting chemical and physical analysis of samples. The module is presented at intermediate academic level as related to analytical laboratory practices.

The learning will enable learners to demonstrate an understanding of:

- KM-04-KT01: Fundamentals of mathematics (30%)
- KM-04-KT02: Fundamentals of physics theory and concepts (30%)
- KM-04-KT03: Fundamentals of chemistry theory and concepts (40%)

4.2 Guidelines for Topics

4.2.1. KM-04-KT01: Fundamentals of mathematics (30%)

Topic elements to be covered include:

- KT0101 Ratio's, proportions and percentages;
- KT0102 Fractions;
- KT0103 Significant numbers;
- KT0104 Linear and quadratic equations;
- KT0105 Theory of calibration graphs;
- KT0106 Statistical calculations – Basic Mean, standard deviation, range, median;
- KT0107 Basics of logarithmic and exponential functions
- KT0108 Introduction to computer literacy (MS Office – Basic – Word, Excel Spreadsheet and word processor).

Internal Assessment Criteria and Weight

- IAC0101 Apply fundamentals of mathematics using problem statements related to basic analytical chemistry as well as common everyday applications

(Weight 30%)

4.2.2. KM-04-KT02: Fundamentals of physics theory and concepts (30%)

Topic elements to be covered include:

- KT0201 Units of measurement including introduction to SI units;
- KT0202 Concepts of temperature including temperature pressure relationships, melting point and vapour pressure;
- KT0203 Density;

- KT0204 Magnetism;
- KT0205 Expansion and contraction of materials;
- KT0206 Basic laws of electricity;
- KT0207 Basic principles of light and colour.

Internal Assessment Criteria and Weight

- IAC0202 Apply fundamentals of physics using problem statements related to basic analytical chemistry as well as common everyday applications

(Weight 30%)

4.2.3. KM-04-KT03: Fundamentals of chemistry theory and concepts (40%)

Topic elements to be covered include:

- KT0301 Units of measurement including introduction to SI units;
- KT0302 Introduction to the periodic table and atomic theory;
- KT0303 Chemical equations including concepts of bonding, ions and valence, Stoichiometry, Reduction and oxidation states;
- KT0304 Basic solution chemistry including solubility, conductivity and solutions, concepts of pH, concepts of mole concentrations
- KT0305 Physical chemistry including properties and states of matter, basic gas laws.

Internal Assessment Criteria and Weight

- IAC0301 Explain fundamentals of chemistry using problem statements related to basic analytical chemistry as well as common everyday applications.

(Weight 40%)

4.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;

- e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
- f. Equipment to demonstrate basic instrumental analysis techniques “ at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
- g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years’ experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

4.4 Exemptions

5. 311101001-KM-05, Analytical Chemistry, NQF Level 4, Credits 30

5.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of advanced analytical processes and complex equipment used for chemical and physical analysis of samples

The learning will enable learners to demonstrate an understanding of:

- KM-05-KT01: Principles and common applications of spectrophotometric techniques (20%)
- KM-05-KT02: Principles and common applications of spectroscopic techniques (20%)
- KM-05-KT03: Principles and common applications of separation techniques (15%)
- KM-05-KT04: Principles and common application of combustion techniques (15%)
- KM-05-KT05: Principles and common application of physical testing techniques (15%)
- KM-05-KT06: Principles and common application of thermal analysis techniques (15%)

5.2 Guidelines for Topics

5.2.1. KM-05-KT01: Principles and common applications of spectrophotometric techniques (20%)

Topic elements to be covered include:

- KT0101 Principles and common applications of UV-visible techniques (including basic principles and mechanism of UV-visible techniques, principal components and primary function of equipment used in UV-visible techniques, factors influencing UV-visible measurements, common application of UV-visible techniques by laboratories, suitability/capabilities of UV-visible techniques, calibration and care of UV-visible measurement equipment, common problems with and responses to UV-visible techniques);
- KT0102 Principles and common applications of infra-red and near infra-red techniques (including basic principles and mechanism of infra-red and near infra-red techniques, principal components and primary function of equipment used in infra-red near infra-red techniques, factors influencing infra-red and near infra-red measurements, common application of infra-red and near infra-red techniques by laboratories, suitability/capabilities of infra-red and near infra-red techniques, calibration and care of infra-red and near infra-red measurement equipment, common problems with and responses to infra-red and near infra-red techniques);
- KT0103 Principles and common applications of Raman techniques (including basic principles and mechanism of Raman techniques, principal components and primary function of equipment used in Raman techniques, factors influencing Raman measurements, common application of Raman techniques by laboratories, suitability/capabilities of Raman techniques, calibration and care of Raman measurement equipment, common problems with and responses to Raman techniques);
- KT0104 Principles and common applications of Nuclear magnetic resonance techniques (including basic principles and mechanism of Nuclear magnetic resonance techniques, principal components and primary function of equipment used in Nuclear magnetic resonance techniques, factors influencing Nuclear magnetic resonance measurements, common application of Nuclear magnetic resonance techniques by laboratories, suitability/capabilities of Raman techniques, calibration and care of Nuclear magnetic resonance measurement equipment, common problems with and responses to Nuclear magnetic resonance techniques).

Internal Assessment Criteria and Weight

- IAC0101 Demonstrate an understanding of the principles and common applications of UV-visible techniques;
- IAC0102 Demonstrate an understanding of the principles and common applications of infra-red and near infra-red techniques;
- IAC0103 Demonstrate an understanding of the principles and common applications of Raman techniques;
- IAC0104 Demonstrate an understanding of the principles and common applications of Nuclear magnetic resonance techniques.

(Weight 20%)

5.2.2. KM-05-KT02: Principles and common applications of spectroscopic techniques (20%)

Topic elements to be covered include:

- KT0201 Principles and common applications of Atomic absorption techniques (including basic principles and mechanism of Atomic absorption techniques, principal components and primary function of equipment used in Atomic absorption techniques, factors influencing Atomic absorption measurements, common application of Atomic absorption techniques by laboratories, suitability/capabilities of Atomic absorption techniques, calibration and care of Atomic absorption measurement equipment, common problems with and responses to Atomic absorption techniques);
- KT0202 Principles and common applications of emission techniques (including basic principles and mechanism of emission techniques, principal components and primary function of equipment used in emission techniques, factors influencing emission measurements, common application of emission techniques by laboratories, suitability/capabilities of emission techniques, calibration and care of emission measurement equipment, common problems with and responses to emission techniques);
- KT0203 Principles and common applications of fluorescence techniques (including basic principles of fluorescence techniques, principal components and primary function of equipment used in fluorescence techniques, factors influencing fluorescence measurements, common application of fluorescence techniques by laboratories, suitability/capabilities of fluorescence techniques, calibration and care of fluorescence measurement equipment, common problems with and responses to fluorescence techniques).

Internal Assessment Criteria and Weight

- IAC0201 Demonstrate an understanding of the principles and common applications of Atomic absorption techniques
- IAC0201 Demonstrate an understanding of the principles and common applications of emission and near infra-red techniques
- IAC0203 Demonstrate an understanding of the principles and common applications of fluorescence techniques

(Weight 20%)

5.2.3. KM-05-KT03: Principles and common applications of separation techniques (15%)

Topic elements to be covered include:

- KT0301 Principles and common applications of Chromatography techniques (including basic principles and mechanism of Chromatography techniques, principal components and primary function of equipment used in Chromatography techniques, factors influencing Chromatography measurements, common application of Chromatography techniques by laboratories, suitability/capabilities of Chromatography techniques, calibration and care of Chromatography measurement equipment, common problems with and responses to Chromatography techniques);
- KT0302 Principles and common applications of distillation techniques (including basic principles of distillation techniques, principal components and primary function of equipment used in distillation techniques, factors influencing distillation measurements, common application of distillation techniques by laboratories, suitability/capabilities of distillation techniques, calibration and care of distillation measurement equipment, common problems with and responses to distillation techniques);
- KT0303 Principles and common applications of phase separation techniques (including basic principles of phase separation techniques, principal components and primary function of equipment used in phase separation techniques, factors influencing phase separation measurements, common application of phase separation techniques by laboratories, suitability/capabilities of phase separation techniques, calibration and care of phase separation measurement equipment, common problems with and responses to phase separation techniques);
- KT0304 Principles and common applications of extraction techniques (including basic principles of extraction techniques, principal components and primary function of equipment used in extraction techniques, factors influencing extraction measurements, common application of extraction techniques by laboratories, suitability/capabilities of extraction techniques, calibration and care of extraction measurement equipment, common problems with and responses to extraction techniques).

Internal Assessment Criteria and Weight

- IAC0301 Demonstrate an understanding of the principles and common applications of Chromatography absorption techniques;
- IAC0302 Demonstrate an understanding of the principles and common applications of distillation and near infra-red techniques;
- IAC0303 Demonstrate an understanding of the principles and common applications of phase separation techniques;
- IAC0304 Demonstrate an understanding of the principles and common applications of extraction techniques.

(Weight 15%)

5.2.4. KM-05-KT04: Principles and common application of combustion techniques (15%)

Topic elements to be covered include:

- KT0401 Principles and common application of elemental analysers (including basic principles of elemental analysers, principal components and primary function of elemental analysers, factors influencing elemental analysers measurements, common application of elemental analysers by laboratories, suitability/capabilities of elemental analysers, calibration and care of elemental analysers, common problems with and responses to elemental analysers) â □ Total Organic carbon and CNS (Carbon nitrogen, Sulphur) Oxygen;

- KT0402 Principles and common application of tube furnace methods (including basic principles and mechanism of tube furnace methods, principal components and primary function of equipment used in tube furnace methods, factors influencing tube furnace method measurements, common application of tube furnace methods by laboratories, suitability/capabilities of tube furnace methods, calibration and care of tube furnace method equipment, common problems with and responses to tube furnace methods).

Internal Assessment Criteria and Weight

- IAC0401 Demonstrate an understanding of the principles and common application of elemental analysers
- IAC0402 Demonstrate an understanding of the principles and common application of tube furnace methods

(Weight 15%)

5.2.5. KM-05-KT05: Principles and common application of physical testing techniques (15%)

Topic elements to be covered include:

- KT0501 Principles and common application of Microscopy techniques (including basic principles of Microscopy techniques, principal components and primary function of equipment used in Microscopy techniques, factors influencing Microscopy technique measurements, common application of Microscopy techniques by laboratories, suitability/capabilities of Microscopy techniques, calibration and care of Microscopy techniques equipment, common problems with and responses to Microscopy techniques);
- KT0502 Principles and common application of particle size distribution by instruments techniques (including basic principles of particle size distribution by instruments techniques, principal components and primary function of equipment used in particle size distribution by instruments techniques, factors influencing particle size distribution by instruments technique measurements, common application of particle size distribution by instruments techniques by laboratories, suitability/capabilities of particle size distribution by instruments techniques, calibration and care of particle size distribution by instruments techniques equipment, common problems with and responses to particle size distribution by instruments techniques);
- KT0503 Principles and common application of tensile strength test techniques (including basic principles of tensile strength test techniques, principal components and primary function of equipment used in tensile strength test techniques, factors influencing tensile strength test technique measurements, common application of tensile strength test techniques by laboratories, suitability/capabilities of tensile strength test techniques, calibration and care of tensile strength test techniques equipment, common problems with and responses to tensile strength test techniques).

Internal Assessment Criteria and Weight

- IAC0501 Demonstrate an understanding of the principles and common application of Microscopy techniques;
- IAC0502 Demonstrate an understanding of the principles and common application of particle size distribution by instruments techniques
- IAC0503 Demonstrate an understanding of the principles and common application of tensile strength test techniques.

(Weight 15%)

5.2.6. KM-05-KT06: Principles and common application of thermal analysis techniques (15%)

Topic elements to be covered include:

- KT0601 Principles and common application of Thermo-gravimetric analysis techniques (including basic principles and mechanism of Thermo-gravimetric analysis techniques, principal components and primary function of equipment used in Thermo-gravimetric analysis techniques, factors influencing Thermo-gravimetric analysis technique measurements, common application of Thermo-gravimetric analysis techniques by laboratories, suitability/capabilities of Thermo-gravimetric analysis techniques, calibration and care of Thermo-gravimetric analysis techniques equipment, common problems with and responses to Thermo-gravimetric analysis techniques);
- KT0602 Principles and common application of differential scanning calorimetry techniques (including basic principles and mechanism of differential scanning calorimetry techniques, principal components and primary function of equipment used in differential scanning calorimetry techniques, factors influencing differential scanning calorimetry technique measurements, common application of differential scanning calorimetry techniques by laboratories, suitability/capabilities of differential scanning calorimetry techniques, calibration and care of differential scanning calorimetry techniques equipment, common problems with and responses to differential scanning calorimetry techniques);
- KT0603 Principles and common application of thermo-mechanical techniques (including basic principles and mechanism of thermo-mechanical techniques, principal components and primary function of equipment used in thermo-mechanical techniques, factors influencing thermo-mechanical technique measurements, common application of thermo-mechanical techniques by laboratories, suitability/capabilities of thermo-mechanical techniques, calibration and care of thermo-mechanical techniques equipment, common problems with and responses to thermo-mechanical techniques);
- KT0604 Principles and common application of calorimetry techniques (including basic principles of calorimetry techniques, principal components and primary function of equipment used in calorimetry techniques, factors influencing calorimetry technique measurements, common application of calorimetry techniques by laboratories, suitability/capabilities of calorimetry techniques, calibration and care of calorimetry techniques equipment, common problems with and responses to calorimetry techniques).

Internal Assessment Criteria and Weight

- IAC0601 Describe with examples/diagramâ™s the principles and common application of Thermo-gravimetric analysis techniques;
- IAC0602 Give examples of the practical application of the techniques in various work environments;
- IAC0603 Demonstrate an understanding of the principles and common application of differential scanning calorimetry techniques;
- IAC0604 Demonstrate an understanding of the principles and common application of thermo-mechanical techniques;
- IAC0605 Demonstrate an understanding of the principles and common application of calorimetry techniques.

(Weight 15%)

5.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - f. Equipment to demonstrate basic instrumental analysis techniques at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years' experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

5.4 Exemptions

SECTION 3B: PRACTICAL SKILL MODULE SPECIFICATIONS

List of Practical Skill Module Specifications

- 311101001-PM-01, Collect a range of samples, NQF Level 2, Credits 7
- 311101001-PM-02, Execute primary and secondary sample preparation as required for the relevant analytical processes (Such as: Tipping, crushing, drying, splitting, pulverizing, milling, Flux preparation, fluxing, fusion, cupellation), NQF Level 2, Credits 8
- 311101001-PM-03, Analyse samples in a chemical laboratory using basic analytical methods and equipment, NQF Level 3, Credits 20
- 311101001-PM-04, Analyse samples in a chemical laboratory applying advanced analytical procedures and using complex equipment., NQF Level 4, Credits 24

1. 311101001-PM-01, Collect a range of samples, NQF Level 2, Credits 7

1.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to practice the skills required to collect samples under different conditions.

The learner will be required to:

- PM-02-PS01: Receive and record samples in the laboratory
- PM-02-PS02: Conduct primary sample preparation
- PM-02-PS03: Conduct secondary sample preparation

1.2 Guidelines for Practical Skills

1.2.1. PM-02-PS01: Receive and record samples in the laboratory

Scope of Practical Skill

Given a range of samples and access to manual and electronic systems for recording the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

1.2.2. PM-02-PS02: Conduct primary sample preparation

Scope of Practical Skill

Given a range of samples and access to all the equipment to conduct primary sample preparation the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

1.2.3. PM-02-PS03: Conduct secondary sample preparation

Scope of Practical Skill

Given a range of samples and access to all the equipment to conduct secondary sample preparation the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

1.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - f. Equipment to demonstrate basic instrumental analysis techniques at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years' experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

1.4 Exemptions

2. 311101001-PM-02, Execute primary and secondary sample preparation as required for the relevant analytical processes (Such as: Tipping, crushing, drying, splitting, pulverizing, milling, Flux preparation, fluxing, fusion, cupellation), NQF Level 2, Credits 8

2.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to practice the skills required to apply a range of primary sample preparation techniques relevant to specific applications.

The learner will be required to:

- PM-03-PS01: Prepare analytical samples
- PM-03-PS02: Prepare chemical reagents, calibration- and analytical standards
- PM-03-PS03: Set up and prepare testing equipment
- PM-03-PS04: Analyse samples

2.2 Guidelines for Practical Skills

2.2.1. PM-03-PS01: Prepare analytical samples

Scope of Practical Skill

Given documented procedures, a range of samples of different matrices requiring preparation for analysis using basic analytical methods, the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

2.2.2. PM-03-PS02: Prepare chemical reagents, calibration- and analytical standards

Scope of Practical Skill

Given specified methods and procedures, equipment and range of chemicals, the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

2.2.3. PM-03-PS03: Set up and prepare testing equipment

Scope of Practical Skill

Given instruments and prepared calibration and quality standards for use in basic analytical methods, the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

2.2.4. PM-03-PS04: Analyse samples

Scope of Practical Skill

Given a range of samples, reagents, specified requirements and calibrated equipment for use in basic analytical methods the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

2.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - f. Equipment to demonstrate basic instrumental analysis techniques – at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years' experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

2.4 Exemptions

3. 311101001-PM-03, Analyse samples in a chemical laboratory using basic analytical methods and equipment, NQF Level 3, Credits 20

3.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to practice the skills required to use basic analytical techniques for the chemical analysis of samples.

The learner will be required to:

- PM-04-PS01: Prepare analytical samples
- PM-04-PS02: Prepare chemical reagents, calibration and analytical standards
- PM-04-PS03: Set up and prepare complex testing equipment
- PM-04-PS04: Analyse samples
- PM-04-PS05: Interpret results by processing complex manipulated data (Combine data from different sources/measurements, validate and integrate)

3.2 Guidelines for Practical Skills

3.2.1. PM-04-PS01: Prepare analytical samples

Scope of Practical Skill

Given documented procedures, a range of samples of different matrices requiring preparation for advanced analysis, the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

3.2.2. PM-04-PS02: Prepare chemical reagents, calibration and analytical standards

Scope of Practical Skill

Given specified methods and procedures, equipment and range of chemicals, the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

3.2.3. PM-04-PS03: Set up and prepare complex testing equipment

Scope of Practical Skill

Given instruments and prepared calibration and quality standards to be used for advanced analysis the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

3.2.4. PM-04-PS04: Analyse samples

Scope of Practical Skill

Given a range of samples, reagents, specified requirements and calibrated equipment for used in advanced analytical processes, the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

3.2.5. PM-04-PS05: Interpret results by processing complex manipulated data (Combine data from different sources/measurements, validate and integrate)

Scope of Practical Skill

Given complex analytical data and quality control procedures applicable to analytical processes the learner must be able to:

Applied Knowledge

Internal Assessment Criteria

3.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - f. Equipment to demonstrate basic instrumental analysis techniques at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five yearsâ€™ experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

3.4 Exemptions

4. 311101001-PM-04, Analyse samples in a chemical laboratory applying advanced analytical procedures and using complex equipment., NQF Level 4, Credits 24

4.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to practice the skills required to use basic analytical techniques for the chemical analysis of samples.

The learner will be required to:

4.2 Guidelines for Practical Skills

4.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Providers must have access to appropriate facilities where the theoretical learning can take place this implies lecture facilities, self-study areas and/or computer based learning hubs;
- Providers must have access to an operational analytical laboratory where the following equipment/apparatus is available:
 - a. Basic sample preparation equipment for solids and liquids;
 - b. Drying equipment;
 - c. Balances;
 - d. Appropriate Glassware;
 - e. Basic non-instrumental physical testing equipment in order to demonstrate at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - f. Equipment to demonstrate basic instrumental analysis techniques “ at least 20% of the techniques described in the curriculum other techniques must be explained using audio visual material;
 - g. Equipment to demonstrate at least one of the following categories of techniques: a. Separation, b. Spectroscopy, c. Spectrophotometry, d. Thermal.
- Laboratories where the practical skills are trained must have appropriate, documented analytical methods and there must be evidence of ongoing measurement of compliance with these approved and scientifically appropriate methods.

Human Resource Requirements:

- Facilitators of learning must be in possession of a recognised chemistry qualification at NQF level 5 or above;
- or
- Facilitators with a recognised chemistry qualification at NQF level 4 with five years’ experience of which at least two years is at a supervisory level
- Facilitators of learning must have a proven track record of working in an analytical laboratory for at least three years at a supervisory level;
- The facilitator/learner ratio must not exceed 1/30 for theory and 1/15 for practical

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

4.4 Exemptions

SECTION 3C: WORK EXPERIENCE MODULE SPECIFICATIONS

List of Work Experience Module Specifications

- 311101001-WM-01, Exposed to the processes of sample collection for a specific industry, NQF Level 2, Credits 8
- 311101001-WM-02, Exposure to the processes of sample preparation as applied within the specific work environment (such as Fire Assay processes), NQF Level 2, Credits 16
- 311101001-WM-03, Exposure to the basic analysis of laboratory samples, NQF Level 3, Credits 16
- 311101001-WM-04, Exposure to the processes of advanced sample analysis in a chemical laboratory, NQF Level 4, Credits 32

1. 311101001-WM-01, Exposed to the processes of sample collection for a specific industry, NQF Level 2, Credits 8

1.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in in collecting and recording samples for a specific work environment.

The learner will be required to:

- WM-01-WE01: Take a range of samples relevant to the specific operation

1.2 Guidelines for Work Experiences

1.2.1. WM-01-WE01: Take a range of samples relevant to the specific operation

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0101 Identify the samples that must be taken
- WA0102 Identify the sample points and interpret the sampling schedule
- WA0103 Prepare for taking the samples, check PPE and all required tools and equipment
- WA0104 Take the sample, lable the sample and ensure transportation to the laboratory
- WA0105 Log sample into laboratory system

Supporting Evidence

1.3 Contextualised Workplace Knowledge

1 Analytical procedures or methods.

2 Codes of conduct.

3 Data reporting systems and protocols.

4 Good laboratory practice.

5 Legislative requirements.

6 Material standards or specifications.

7 Operating procedures of laboratory equipment.

8 Process knowledge.

9 Safety Health, Environmental, Risk and Quality laboratory practices.

10 Standard instructions.

11 Standard operating procedures.

12 Workplace primary sample preparation practices.

13 Workplace specific chemistry knowledge.

14 Workplace specific laboratory terminology

1.4 Criteria for Workplace Approval

Physical Requirements:

- Access to a fully equipped analytical laboratory as related to the scope of work experience covered in the module.
- The laboratory must at least be able to provide work experience to learners on:
 - a. Sampling or sample preparation
 - b. pH or ion selective or conductivity measurements
 - c. Gravimetric methods
 - d. Titration methods
-

Human Resource Requirements:

- Laboratory Analyst, with at least 3 years experience to act as Coach/Mentor
- Coach to Learner ratio of 1:5
-

Legal Requirements:

- Compliance with all regulatory requirements.

1.5 Additional Assignments to be Assessed Externally

2. 311101001-WM-02, Exposure to the processes of sample preparation as applied within the specific work environment (such as Fire Assay processes), NQF Level 2, Credits 16

2.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in using primary and secondary techniques for sample preparation as required for the specific work place.

The learner will be required to:

- WM-02-WE01: Execute primary and secondary sample preparation relevant to the specific operational requirements

2.2 Guidelines for Work Experiences

2.2.1. WM-02-WE01: Execute primary and secondary sample preparation relevant to the specific operational requirements

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0101 Check all sample preparation equipment
- WA0102 Identify the sample preparation required and review the required procedure
- WA0103 Conduct required risk assessments and ensure availability of PPE and all tools and equipment
- WA0104 Prepare samples according to requirements
- WA0105 Conduct housekeeping and proper labeling and storing of prepared samples

Supporting Evidence

- SE0101 Quality assurance reports
- SE0102 Laboratory records
- SE0103 Customer complaints
- SE0104 Safety inspection reports
- SE0105 Deviation reports
- SE0106 Turnaround time
- SE0107 Internal quality audit reports

2.3 Contextualised Workplace Knowledge

1. Analytical procedures or methods. 2. Codes of conduct. 3. Data reporting systems and protocols. 4. Good laboratory practice. 5. Legislative requirements. 6. Material standards or specifications. 7. Operating procedures of laboratory equipment. 8. Process knowledge. 9. Safety Health, Environmental, Risk and Quality laboratory practices. 10. Standard instructions. 11. Standard operating procedures. 12. Workplace

primary sample preparation practices. 13. Workplace specific chemistry knowledge. 14. Workplace specific laboratory terminology

2.4 Criteria for Workplace Approval

Physical Requirements:

- Access to a fully equipped analytical laboratory as related to the scope of work experience covered in the module.
- The laboratory must at least be able to provide work experience to learners on:
 - a. Sampling or sample preparation
 - b. pH or ion selective or conductivity measurements
 - c. Gravimetric methods
 - d. Titration methods

Human Resource Requirements:

- Laboratory Analyst, with at least 3 years experience to act as Coach/Mentor;
- Coach to Learner ratio of 1:5.
-

Legal Requirements:

- Compliance with all regulatory requirements.

2.5 Additional Assignments to be Assessed Externally

3. 311101001-WM-03, Exposure to the basic analysis of laboratory samples, NQF Level 3, Credits 16

3.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in executing chemical sample analysis using basic techniques and equipment as required by the specific workplace.

The learner will be required to:

- WM-03-WE01: Apply Good Laboratory Practice principles
- WM-03-WE02: Analyse samples using a range of basic methods
- WM-03-WE03: Capture data and report results

3.2 Guidelines for Work Experiences

3.2.1. WM-03-WE01: Apply Good Laboratory Practice principles

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0101 Comply with workplace requirements on Good Laboratory Practices during at least two job observations conducted during a 4 week period
- WA0102 Adhere to workplace safety, health, environmental protection, risk and quality standards and procedures at all times

Supporting Evidence

- SE0101 Quality assurance reports
- SE0102 Laboratory records
- SE0103 Customer complaints
- SE0104 Safety inspection reports
- SE0105 Deviation reports
- SE0106 Turnaround time
- SE0107 Internal quality audit reports

3.2.2. WM-03-WE02: Analyse samples using a range of basic methods

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0201 Analyse a range of samples of different matrices
- WA0202 Use at least three different basic methods
- WA0203 Use volumetric glassware and balances in the accepted manner

- WA0204 Conduct analysis to accepted workplace standards during the 4 week period
- WA0205 Meet turnaround times for samples analysed
- WA0206 Demonstrate accepted understanding of workplace specific chemistry during the execution of work
- WA0207 Demonstrate understanding of workplace specific primary sample preparation practices and the implications thereof on accurate sample analysis
- WA0208 Demonstrate understanding of the use and implications of sample analysis results on workplace specific operational processes (where applicable)

Supporting Evidence

- SE0201 Quality assurance reports
- SE0202 Laboratory records
- SE0203 Customer complaints
- SE0204 Safety inspection reports
- SE0205 Deviation reports
- SE0206 Turnaround time
- SE0207 Internal quality audit reports

3.2.3. WM-03-WE03: Capture data and report results

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0301 Maintain accurate and readily available data on samples analysed during the four week period using workplace data reporting systems and protocols
- WA0302 Use and understand workplace specific laboratory terminology during communication and reporting
- WA0303 Collect and record data to ensure the availability of accurate and complete records
- WA0304 Maintain standards of timeous reporting of data
- WA0305 Adhere to reporting channels

Supporting Evidence

- SE0301 Quality assurance reports
- SE0302 Laboratory records
- SE0303 Customer complaints
- SE0304 Safety inspection reports
- SE0305 Deviation reports

- SE0306 Turnaround time
- SE0307 Internal quality audit reports

3.3 Contextualised Workplace Knowledge

1. Analytical procedures or methods. 2. Codes of conduct. 3. Data reporting systems and protocols. 4. Good laboratory practice. 5. Legislative requirements. 6. Material standards or specifications. 7. Operating procedures of laboratory equipment. 8. Process knowledge. 9. Safety Health, Environmental, Risk and Quality laboratory practices. 10. Standard instructions. 11. Standard operating procedures. 12. Workplace primary sample preparation practices. 13. Workplace specific chemistry knowledge. 14. Workplace specific laboratory terminology

3.4 Criteria for Workplace Approval

Physical Requirements:

- Access to a fully equipped analytical laboratory as related to the scope of work experience covered in the module.
- The laboratory must at least be able to provide work experience to learners on:
 - a. Sampling or sample preparation;
 - b. pH or ion selective or conductivity measurements;
 - c. Gravimetric methods; and
 - d. Titration methods.
-

Human Resource Requirements:

- Laboratory Analyst, with at least 3 years experience to act as Coach/Mentor;
- Coach to Learner ratio of 1:5.
-

Legal Requirements:

- Compliance with all regulatory requirements.

3.5 Additional Assignments to be Assessed Externally

4. 311101001-WM-04, Exposure to the processes of advanced sample analysis in a chemical laboratory, NQF Level 4, Credits 32

4.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in applying advanced sample analysis techniques and using complex equipment as is required by the specific workplace.

The learner will be required to:

- WM-04-WE01: Conduct analysis of samples using a range of advanced processes
- WM-04-WE02: Execute discretion based on results and data
- WM-04-WE03: Perform first-level trouble-shooting, corrective and preventive actions

4.2 Guidelines for Work Experiences

4.2.1. WM-04-WE01: Conduct analysis of samples using a range of advanced processes

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0101 Conduct analysis to accepted workplace standards for a minimum period of 12 weeks
- WA0102 Conduct analysis by applying at least two advanced processes each one selected from a different category
- WA0103 Comply with workplace specific analytical processes, procedures or methods
- WA0104 Meet turnaround times for samples analysed
- WA0105 Perform calibration, standardisation and verification of equipment to accepted workplace standards
- WA0106 Respond to variations in samples matrices and concentrations
- WA0107 Verify sample result in accordance with quality management requirements
- WA0108 Demonstrate accepted understanding of workplace specific chemistry
- WA0109 Adhere to workplace safety, health, environmental, risk protection and quality standards and procedures
- WA0110 Maintain accepted sample analysis standards during workplace pressure situations
- WA0111 Adapt analytical procedures to workplace specific requirements within the limits of specified analytical processes, workplace procedures or methods.

Supporting Evidence

- SE0101 Quality assurance reports
- SE0102 Laboratory records
- SE0103 Customer complaints

- SE0104 Safety inspection reports
- SE0105 Deviation reports
- SE0106 Turnaround time
- SE0107 Internal quality audit reports

4.2.2. WM-04-WE02: Execute discretion based on results and data

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0201 Maintain accurate and readily available data on samples analysed for the 12 week period using workplace data reporting systems and protocols
- WA0202 Log data of equipment operation and maintenance records for the 12 week period to workplace requirements
- WA0203 Recognise and respond to trends observed on sample results in accordance with workplace procedures
- WA0204 Respond to sample analysis results obtained in accordance with the potential implications on workplace specific operational processes (where applicable)
- WA0205 Relate sample analysis results to prescribed workplace material specification and standards and respond in accordance with the potential implications (where applicable)

Supporting Evidence

- SE0201 Quality assurance reports
- SE0202 Laboratory records
- SE0203 Customer complaints
- SE0204 Safety inspection reports
- SE0205 Deviation reports
- SE0206 Turnaround time
- SE0207 Internal quality audit reports

4.2.3. WM-04-WE03: Perform first-level trouble-shooting, corrective and preventive actions

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0301 Perform first-level trouble-shooting, corrective and preventative actions required for the 12 week period
- WA0302 Perform prescribed equipment cleaning, care and maintenance procedures

Supporting Evidence

- SE0301 Quality assurance reports
- SE0302 Laboratory records
- SE0303 Customer complaints
- SE0304 Safety inspection reports
- SE0305 Deviation reports
- SE0306 Turnaround time
- SE0307 Internal quality audit reports

4.3 Contextualised Workplace Knowledge

1. Analytical procedures or methods. 2. Codes of conduct. 3. Data reporting systems and protocols. 4. Good laboratory practice. 5. Legislative requirements. 6. Material standards or specifications. 7. Operating procedures of laboratory equipment. 8. Process knowledge. 9. Safety Health, Environmental, Risk and Quality laboratory practices. 10. Standard instructions. 11. Standard operating procedures. 12. Workplace primary sample preparation practices. 13. Workplace specific chemistry knowledge. 14. Workplace specific laboratory terminology

4.4 Criteria for Workplace Approval

Physical Requirements:

Human Resource Requirements:

Legal Requirements:

4.5 Additional Assignments to be Assessed Externally

Assignment 1: Comparative study of analytical data Elements to be assessed: The ability to conduct an evaluation on analytical data generated through at least two different methods Evaluation

Criteria: A report on the evaluation of the two sets of analytical data on the basis of: Turnaround time Cost Accuracy Safety consideration A recommendation on the most appropriate method

SECTION 4: STATEMENT OF WORK EXPERIENCE

Curriculum Number:	311101001
Curriculum Title:	Chemical Laboratory Analyst

Learner Details	
Name:	
ID Number:	

Employer Details	
Company Name:	
Address:	
Supervisor Name:	
Work Telephone:	
E-Mail:	

311101001-WM-01, Exposed to the processes of sample collection for a specific industry, NQF Level 2, Credits 8

WM-01-WE01	Take a range of samples relevant to the specific operation		
	Scope Work Experience	Date	Signature
WA0101	Identify the samples that must be taken		
WA0102	Identify the sample points and interpret the sampling schedule		
WA0103	Prepare for taking the samples, check PPE and all required tools and equipment		
WA0104	Take the sample, label the sample and ensure transportation to the laboratory		
WA0105	Log sample into laboratory system		

	Contextualised Workplace Knowledge	Date	Signature
1	Analytical procedures or methods.		
2	Codes of conduct.		
3	Data reporting systems and protocols.		
4	Good laboratory practice.		
5	Legislative requirements.		
6	Material standards or specifications.		
7	Operating procedures of laboratory equipment.		
8	Process knowledge.		

9	Safety Health, Environmental, Risk and Quality laboratory practices.		
10	Standard instructions.		
11	Standard operating procedures.		
12	Workplace primary sample preparation practices.		
13	Workplace specific chemistry knowledge.		
14	Workplace specific laboratory terminology		

	Additional Assignments to be Assessed Externally	Date	Signature
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311101001-WM-02, Exposure to the processes of sample preparation as applied within the specific work environment (such as Fire Assay processes), NQF Level 2, Credits 16

WM-02-WE01	Execute primary and secondary sample preparation relevant to the specific operational requirements		
	Scope Work Experience	Date	Signature
WA0101	Check all sample preparation equipment		
WA0102	Identify the sample preparation required and review the required procedure		
WA0103	Conduct required risk assessments and ensure availability of PPE and all tools and equipment		
WA0104	Prepare samples according to requirements		
WA0105	Conduct housekeeping and proper labeling and storing of prepared samples		

	Supporting Evidence	Date	Signature
SE0101	Quality assurance reports		
SE0102	Laboratory records		
SE0103	Customer complaints		
SE0104	Safety inspection reports		
SE0105	Deviation reports		
SE0106	Turnaround time		
SE0107	Internal quality audit reports		

	Contextualised Workplace Knowledge	Date	Signature
1	1. Analytical procedures or methods. 2. Codes of conduct. 3. Data reporting systems and protocols. 4. Good laboratory practice. 5. Legislative requirements. 6. Material standards or specifications. 7. Operating procedures of laboratory equipment. 8. Process knowledge. 9. Safety Health, Environmental, Risk and Quality laboratory practices. 10. Standard instructions. 11. Standard operating procedures. 12. Workplace primary sample preparation practices. 13. Workplace specific chemistry knowledge. 14. Workplace specific laboratory terminology		

	Additional Assignments to be Assessed Externally	Date	Signature

311101001-WM-03, Exposure to the basic analysis of laboratory samples, NQF Level 3, Credits 16

WM-03-WE01	Apply Good Laboratory Practice principles		
	Scope Work Experience	Date	Signature
WA0101	Comply with workplace requirements on Good Laboratory Practices during at least two job observations conducted during a 4 week period		
WA0102	Adhere to workplace safety, health, environmental protection, risk and quality standards and procedures at all times		
	Supporting Evidence	Date	Signature
SE0101	Quality assurance reports		
SE0102	Laboratory records		
SE0103	Customer complaints		
SE0104	Safety inspection reports		
SE0105	Deviation reports		
SE0106	Turnaround time		
SE0107	Internal quality audit reports		
WM-03-WE02	Analyse samples using a range of basic methods		
	Scope Work Experience	Date	Signature
WA0201	Analyse a range of samples of different matrices		
WA0202	Use at least three different basic methods		
WA0203	Use volumetric glassware and balances in the accepted manner		
WA0204	Conduct analysis to accepted workplace standards during the 4 week period		

WA0205	Meet turnaround times for samples analysed		
WA0206	Demonstrate accepted understanding of workplace specific chemistry during the execution of work		
WA0207	Demonstrate understanding of workplace specific primary sample preparation practices and the implications thereof on accurate sample analysis		
WA0208	Demonstrate understanding of the use and implications of sample analysis results on workplace specific operational processes (where applicable)		
	Supporting Evidence	Date	Signature
SE0201	Quality assurance reports		
SE0202	Laboratory records		
SE0203	Customer complaints		
SE0204	Safety inspection reports		
SE0205	Deviation reports		
SE0206	Turnaround time		
SE0207	Internal quality audit reports		
WM-03-WE03	Capture data and report results		
	Scope Work Experience	Date	Signature
WA0301	Maintain accurate and readily available data on samples analysed during the four week period using workplace data reporting systems and protocols		
WA0302	Use and understand workplace specific laboratory terminology during communication and reporting		
WA0303	Collect and record data to ensure the availability of accurate and complete records		
WA0304	Maintain standards of timeous reporting of data		
WA0305	Adhere to reporting channels		

	Supporting Evidence	Date	Signature
SE0301	Quality assurance reports		
SE0302	Laboratory records		
SE0303	Customer complaints		
SE0304	Safety inspection reports		
SE0305	Deviation reports		
SE0306	Turnaround time		
SE0307	Internal quality audit reports		

	Contextualised Workplace Knowledge	Date	Signature
1	1. Analytical procedures or methods. 2. Codes of conduct. 3. Data reporting systems and protocols. 4. Good laboratory practice. 5. Legislative requirements. 6. Material standards or specifications. 7. Operating procedures of laboratory equipment. 8. Process knowledge. 9. Safety Health, Environmental, Risk and Quality laboratory practices. 10. Standard instructions. 11. Standard operating procedures. 12. Workplace primary sample preparation practices. 13. Workplace specific chemistry knowledge. 14. Workplace specific laboratory terminology		

	Additional Assignments to be Assessed Externally	Date	Signature

311101001-WM-04, Exposure to the processes of advanced sample analysis in a chemical laboratory, NQF Level 4, Credits 32

WM-04-WE01	Conduct analysis of samples using a range of advanced processes		
	Scope Work Experience	Date	Signature
WA0101	Conduct analysis to accepted workplace standards for a minimum period of 12 weeks		
WA0102	Conduct analysis by applying at least two advanced processes each one selected from a different category		
WA0103	Comply with workplace specific analytical processes, procedures or methods		
WA0104	Meet turnaround times for samples analysed		
WA0105	Perform calibration, standardisation and verification of equipment to accepted workplace standards		
WA0106	Respond to variations in samples matrices and concentrations		
WA0107	Verify sample result in accordance with quality management requirements		
WA0108	Demonstrate accepted understanding of workplace specific chemistry		
WA0109	Adhere to workplace safety, health, environmental, risk protection and quality standards and procedures		
WA0110	Maintain accepted sample analysis standards during workplace pressure situations		
WA0111	Adapt analytical procedures to workplace specific requirements within the limits of specified analytical processes, workplace procedures or methods.		
	Supporting Evidence	Date	Signature

SE0101	Quality assurance reports		
SE0102	Laboratory records		
SE0103	Customer complaints		
SE0104	Safety inspection reports		
SE0105	Deviation reports		
SE0106	Turnaround time		
SE0107	Internal quality audit reports		
WM-04-WE02	Execute discretion based on results and data		
	Scope Work Experience	Date	Signature
WA0201	Maintain accurate and readily available data on samples analysed for the 12 week period using workplace data reporting systems and protocols		
WA0202	Log data of equipment operation and maintenance records for the 12 week period to workplace requirements		
WA0203	Recognise and respond to trends observed on sample results in accordance with workplace procedures		
WA0204	Respond to sample analysis results obtained in accordance with the potential implications on workplace specific operational processes (where applicable)		
WA0205	Relate sample analysis results to prescribed workplace material specification and standards and respond in accordance with the potential implications (where applicable)		
	Supporting Evidence	Date	Signature
SE0201	Quality assurance reports		
SE0202	Laboratory records		

SE0203	Customer complaints		
SE0204	Safety inspection reports		
SE0205	Deviation reports		
SE0206	Turnaround time		
SE0207	Internal quality audit reports		
WM-04-WE03	Perform first-level trouble-shooting, corrective and preventive actions		
	Scope Work Experience	Date	Signature
WA0301	Perform first-level trouble-shooting, corrective and preventative actions required for the 12 week period		
WA0302	Perform prescribed equipment cleaning, care and maintenance procedures		
	Supporting Evidence	Date	Signature
SE0301	Quality assurance reports		
SE0302	Laboratory records		
SE0303	Customer complaints		
SE0304	Safety inspection reports		
SE0305	Deviation reports		
SE0306	Turnaround time		
SE0307	Internal quality audit reports		

	Contextualised Workplace Knowledge	Date	Signature
1	1. Analytical procedures or methods. 2. Codes of conduct. 3. Data reporting systems and		

	protocols. 4. Good laboratory practice. 5. Legislative requirements. 6. Material standards or specifications. 7. Operating procedures of laboratory equipment. 8. Process knowledge. 9. Safety Health, Environmental, Risk and Quality laboratory practices. 10. Standard instructions. 11. Standard operating procedures. 12. Workplace primary sample preparation practices. 13. Workplace specific chemistry knowledge. 14. Workplace specific laboratory terminology		
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	Additional Assignments to be Assessed Externally	Date	Signature
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