

**REPUBLIC OF KENYA**

**COMPETENCY-BASED MODULAR CURRICULUM**

**FOR**

**FOOD TECHNOLOGY**

**KNQF: LEVEL 6**

**PROGRAMME ISCED CODE:** **0721 554A**

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**FOREWORD**

The provision of quality education and training is fundamental to the Government’s overall strategy for social and economic development. Quality education and training contribute to the achievement of Kenya’s development blueprint and sustainable development goals.

Reforms in the education sector are necessary to achieve Kenya Vision 2030 and meet the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution, and this resulted in the formulation of the Policy Framework for Reforming Education and Training in Kenya (Sessional Paper No. 14 of 2012). A key feature of this policy is the radical change in the design and delivery of TVET training. This policy document requires that training in TVET be competency-based, curriculum development be industry-led, certification be based on demonstration of competence, and the mode of delivery allow for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed. For trainees to build their skills on foundational hands-on activities of the occupation, units of learning are grouped in modules. This has eliminated duplication of content and streamlined exemptions based on skills acquired as a trainee progresses in the up-skilling process, while at the same time allowing trainees to be employable in the shortest time possible through the acquisition of part qualifications.

It is my conviction that this curriculum will play a great role in developing competent human resources for the food technology Sector’s growth and development.

**PRINCIPAL SECRETARY**

**STATE DEPARTMENT FOR TVET**

**MINISTRY OF EDUCATION**

**PREFACE**

Kenya Vision 2030 aims to transform Kenya into a newly industrializing middle-income country, providing high-quality life to all its citizens by the year 2030. Kenya intends to create globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through lifelong education and training. TVET has a responsibility to facilitate the process of inculcating knowledge, skills, and worker behaviour necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency-Based Education and Training (CBET).

TVET Act CAP 210A and Sessional Paper No. 1 of 2019 on Reforming Education and Training in Kenya for Sustainable Development emphasized the need to reform curriculum development, assessment, and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry, as well as increase the global competitiveness of the Kenyan labour force.

This curriculum has been developed in adherence to the Kenya National Qualifications Framework and CBETA standards and guidelines. The curriculum is designed and organized into Units of Learning with Learning Outcomes, suggested delivery methods, learning resources, and methods of assessing the trainee’s achievement. In addition, the units of learning have been grouped in modules to concretize the skills acquisition process and streamline upskilling.

I am grateful to all expert trainers and everyone who played a role in translating the Occupational Standards into this competency-based modular curriculum.

**CHAIRMAN**

**ACKNOWLEDGMENT**

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support were received from expert trainers, institutions and organizations.

I recognize with appreciation the role of the Food Technology National Sector Skills Committee (NSSC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the food technology sector for their valuable input and everyone who participated in developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that individuals aspiring to work in the Food Technology Sector acquire competencies to perform their work more efficiently and effectively.

**COUNCIL SECRETARY/ CEO**

**ACRONYMS**

CBET Competency-Based Education and Training

CIP Cleaning In Place

COP Cleaning Out of Place

CPU Central processing Unit

CV Curriculum Vitae

DDoS Distributed denial of service

DVI Digital Visual Interface

EAS East Africa Standard

GB Gigabytes

HDMI High-Definition Multimedia Interface

IoT Internet of Things

KCSE Kenya Certificate of Secondary Education

KFS Kenya Forest Service

LCD Liquid Crystal Display

MitM Man-in-the-middle

PPEs Personal Protective Equipment

QAC Quaternary Ammonium Compound

RAM Random Access Memory

TVETA Technical and Vocational Education and Training Authority

USB Universal Serial Bus

UV Ultra Violet

UV-VIS Ultra Violet - Visible

KEBS Kenya Bureau of Standards

**KEY TO ISCED UNIT CODES**

**Sector / Industry**

**Sub Sector**

**Occupational Area**

**Version Control**

**Unit of Competence Number**

**ISCED level, Programme Orientation and Level of Completion**

xx

x

xxx

x

x

x

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**COURSE OVERVIEW**

Food Technology Level 6 qualification consists of competencies that an individual must achieve to enable him/her to perform Food Processing. It involves performing quality assurance, maintaining food plant hygiene, processing dairy products, processing fruits and vegetables products, processing beverages products, processing meat products, processing cereal products, Processing sugar and confectionery products, Processing fats and oils products and developing new food products.

**Summary of Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Units Title** | **Unit Duration (Hours)** | **Credit Factor** |
| **MODULE I** | | | |
| 0031 441 01A | Communication Skills | 40 | 4 |
| 0721 451 02A | Food Processing Raw Materials Preparation | 100 | 10 |
| 0721 451 03A | Food Plant Hygiene | 100 | 10 |
| 0721 451 04A | Dairy Products Processing | 160 | 16 |
| **MODULE II** | | | |
| 0417 441 05A | Work Ethics & Practices | 40 | 40 |
| 0721 451 06A | Food Processing and Preservation Principles I | 60 | 6 |
| 0721 451 07A | Fruits And Vegetables Processing | 150 | 15 |
| 0721 451 08A | Baked Products Processing | 150 | 15 |
| **MODULE III** | | | |
| 0417441 09A | Digital Literacy | 40 | 4 |
| 0721 451 10A | Food Laboratory Practice | 120 | 12 |
| 0721 451 11A | Confectioneries Processing | 160 | 16 |
| 0721 451 12A | Meat Products Processing I | 100 | 10 |
| **MODULE IV** | | | |
| 0413 541 13A | Entrepreneurial Skills | 40 | 4 |
| 0721 551 14A | Food Laboratory Techniques | 60 | 6 |
| 0721 551 15A | Food Processing and Preservation Principles II | 100 | 10 |
| 0721 551 16A | Beverage Products Processing | 120 | 12 |
| 0721 551 17A | Meat Processing II | 80 | 8 |
| **MODULE V** | | | |
| 0721 551 18A | Cereal Products Processing | 100 | **10** |
| 0721 551 19A | Fats And Oils Processing | 200 | 20 |
| 0721 551 20A | Sugar Processing | 100 | 10 |
| **MODULE VI** | | | |
| 0111 551 21A | Research Project | 100 | 10 |
| 0721 551 22A | Food Processing Quality Assurance | 120 | 12 |
| 0721 551 23A | New Food Product Development | 120 | 12 |
| **Sub Total** | | **2380** | **238** |
| **Industry Training** | | **480** | **48** |
| **GRAND TOTAL** | | **2860** | **286** |

Total number of hours is **2860** inclusive of **480** hours of industrial attachment.

**Entry Requirements**

An individual enrolling for this course should have any of the following minimum requirements:

1. Kenya Certificate of Secondary Education (KCSE) mean grade C- (minus)

**Or**

1. Food Technology certificate KNQF level 5

**O**r

1. Equivalent qualification as determined by TVETA

**Trainer qualifications**

Qualifications of a trainer for this course include:

1. Possession of Food Technology level 7 of a higher qualification in related trade area; and
2. Registered by TVETA.

**Assessment and certification**

**Industry Training**

An individual enrolled in this course will be required to undergo Industry training for a minimum period of 480 hours in the food processing sector. The industrial training may be taken after completion of all units for those pursuing the full qualification or be distributed equally in each unit for those pursuing part qualification. In the case of dual training model, industrial training shall be as guided by the dual training policy.

The course shall be assessed formatively and summative:

1. During formative assessment all performance criteria shall be assessed based on performance criteria weighting.
2. Number of formative assessments shall minimally be equal to the number of elements in a unit of competency.
3. During summative assessment basic and common units may be integrated in the core units or assessed as discrete units.
4. Theoretical and practical weighting for each unit of learning shall be as follows:
5. 30:70 for module 1, module 2 and module 3
6. 40:60 for module 4, module 5 and module 6
7. Formative and summative assessments shall be weighted at 60% and 40% respectively in the overall unit of learning score

For a candidate to be declared competent in a unit of competency, the candidate must meet the following conditions:

1. Obtained at least 40% in theory assessment in formative and summative assessments.
2. Obtained at least 60% in practical assessment in formative and summative assessment where applicable.
3. Obtained at least 50% in the weighted results between formative assessment and summative assessment where the former constitutes 60% and the latter 40% of the overall score.
4. Assessment performance rating for each unit of competency shall be as follows:

|  |  |
| --- | --- |
| **MARKS** | **COMPETENCE RATING** |
| 80 -100 | Attained Mastery |
| 65 - 79 | Proficient |
| 50 - 64 | Competent |
| 49 and below | Not Yet Competent |
| Y | Assessment Malpractice/irregularities |

1. Assessment for Recognition of Prior Learning (RPL) may lead to award of part and/or full qualification.

**Certification**

A candidate will be issued with a Certificate of Competency upon demonstration of competence in a core Unit of Competency. To be issued with Kenya **National TVET Certificate** in Food Technology Level 6, the candidate must demonstrate competence in all the Units of Competency as given in the qualification pack. A Statement of Attainment certificate may be issued upon demonstration of competence in a certifiable element within a unit.

The certificates will be issued by the Qualification Awarding Institution

## COMMUNICATION SKILLS

**UNIT CODE:** 0031 441 01A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Apply Communication Skills**

**Duration of Unit:** 40 hours

**Unit Description**

This unit covers the competencies required to apply communication skills. It involves applying communication channels, written, non-verbal, oral, and group communication skills.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Apply communication channels | 10 |
| 2. | Apply written communication skills | 12 |
| 3. | Apply non-verbal communication skills | **4** |
| 4. | Apply oral communication skills | **4** |
|  | Apply group communication skills | **10** |
| **Total** | | **40** |

**Learning Outcomes, Content, and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Apply communication channels | 1. Communication process 2. Principles of effective communication 3. Channels/medium/modes of communication 4. Factors to consider when selecting a channel of communication 5. Barriers to effective communication 6. Flow/patterns of communication 7. Sources of information 8. Organizational policies | * Oral questions * Written assessment * Portfolio of Evidence * Practical assessment * Third party report |
| 1. Apply written communication skills | 1. Types of written communication 2. Elements of communication 3. Organization requirements for written communication | * Oral assessment * Written assessment * Portfolio of Evidence * Practical assessment * Third party report |
| 1. Apply non-verbal communication skills | * 1. Utilize body language and   2. Gestures   3. Apply body posture   4. Apply workplace dressing code | * Oral assessment * Written assessment * Portfolio of Evidence * Practical assessment * Third party report |
| 1. Apply oral communication skills | * 1. Types of oral communication pathways   2. Effective questioning techniques   3. Workplace etiquette   4. Active listening | * Oral assessment * Written assessment * Portfolio of Evidence * Practical assessment * Third party report |
| 1. Apply group discussion skills | 1. Establishing rapport 2. Facilitating resolution of issues 3. Developing action plans 4. Group organization techniques 5. Turn-taking techniques 6. Conflict resolution techniques 7. Team-work | * Practical * Portfolio of Evidence * Oral assessment * Written assessment |

**Suggested Methods of Instruction**

* Practical
* Demonstrations
* Project
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Report writing templates | Digital report template | 5 | 1:5 |
|  | Flashcards | Educational flash cards | 5 | 1:5 |
|  | Flip charts | Educational flip charts | 5 | 1:5 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
| 1. **Consumable materials** | | | | |
|  | Printing Papers | A4 | Enough for 25 | 1:25 |
|  | Assorted whiteboard markers | Non-permanent | Enough for 25 | 1:25 |
| 1. **Tools and equipment** | | | | |
|  | Mobile phones | Functioning smart phone | Enough for 25 | 1:25 |

**FOOD PROCESSING RAW MATERIALS PREPARATION**

**ISCED UNIT CODE: 0721 451 02A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Prepare Food Processing Raw Materials**

**Duration of Unit:** **100 Hrs**

**Unit Description**

This unit specifies the competencies required to prepare food processing raw materials. It involves receiving, sorting and cleaning food processing raw materials.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Receive food processing raw materials | 40 |
| 2. | Sort food processing raw materials | 30 |
| 3. | Clean food processing raw materials | 30 |
| **Total** | | **100** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Receive food processing raw materials | * 1. Acquisition of raw materials   2. Food raw materials at reception      1. Milk      2. Wheat flour      3. Sugar      4. Fruits      5. Eggs      6. Vegetables      7. Roots and tubers      8. Spices      9. Meat      10. Tea      11. Coffee   3. Documentations of supplies      1. Certificate of analysis   4. Raw material properties      1. Geometric Properties      2. Colour      3. Texture      4. Flavour      5. Functional Properties   5. Deterioration of Raw Materials   6. Damage to Raw Material   7. Raw material inspections   8. Documentation of conforming and non-conforming raw materials | * Practical assessment * Portfolio of evidence * Third party report * Written tests * Oral assessment |
| 1. Sort food processing raw materials | * 1. Sorting and grading of raw materials      1. Sorting methods         1. Weight sorting         2. Size sorting         3. Shape sorting      2. Colour sorting      3. Manual grading      4. Machine grading      5. Product damage      6. Reasons for sorting and grading      7. Grading factors   2. Sorting and grading equipment   3. Documentation for sorting and grading | * Practical assessment * Portfolio of evidence * Third party report * Written tests * Oral assessment |
| 1. Clean food processing raw materials | * 1. Food contaminants   2. Functions of cleaning   3. Raw material cleaning methods      1. Wet cleaning methods         1. Soaking         2. Spraying         3. Fluming         4. Floatation         5. ultrasonic cleaning         6. filtration, settling      2. Dry cleaning methods         1. Screening         2. brushing         3. aspiration         4. abrasion         5. magnetic separation   4. Cleaning equipment   5. Disposal of food contaminants | * Practical assessment * Portfolio of evidence * Third party report * Written tests * Oral assessment |

**Suggested Methods of Instructions**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Personal protective equipment | * Lab Coats * Safety Goggles * Gloves * Ear muffs | 25 each | 1:1 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:1 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 2 | 1:25 |
|  | Lab Benches/Workstations | Permanent lab benches | Adequate for 25 trainees | 1:25 |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
| 1. **Consumable materials** | | | | |
|  | Food materials | Milk | 10 liters | 1:3 |
| Wheat flour | 10 kg | 1:3 |
| Sugar |  | 1:3 |
| Assorted Fruits (passion, pineapple, mangoes bananas) | 10 kg each | 1:3 |
| Eggs | 10 crates | 1:3 |
| Assorted Vegetables (leafy vegetables, potatoes, French beans, peas) | 10 kg each | 1:3 |
| Assorted Roots and tubers | 10 kg each | 1:3 |
| Spices | 5 kg | 1:5 |
| 1. **Tools and equipment** | | | | |
|  | Sieves | Assorted Sieves | 1 | 1:25 |
|  | Screening equipment | Round hole Screen | 1 | 1:25 |
|  | Air screen grain cleaner | 1 | 1:25 |
|  | Measuring equipment | Micrometer screw gauge  Vernier calipers | 5 | 1:5 |
|  | Weighing equipment | Weighing machine  Weighing balances | 5 | 1:5 |
|  | Colour measuring equipment | Colour charts | 10 | 1:3 |
| Colorimeter | 5 | 1:5 |

**FOOD PLANT HYGIENE**

**ISCED UNIT CODE:** 0721 451 03A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Maintain Food Plant Hygiene**

**Duration of Unit:** 100 hrs

**Unit description**

This unit describes the competencies required to maintain food plant hygiene. It involves cleaning food plant, sanitizing food plant, managing food wastes, controlling environmental pollution and using resources sustainably.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Clean food plant | 25 |
| 2. | Sanitize food plant | 20 |
| 3. | Manage food waste | 20 |
| 4. | Control environmental pollution | 25 |
| 5 | Use resources sustainably | 10 |
| **Total** | | **100** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Clean food plant | 1. Principles of sanitation 2. Water treatment 3. coagulation 4. Filtration 5. Sedimentation 6. Softening 7. Disinfection 8. Terminologies 9. Cleaning 10. Sanitisation 11. Sanitation 12. Hygiene 13. PPES for cleaning 14. Hair net 15. Dust coats 16. Gumboots 17. Gloves 18. Masks 19. Safety googles 20. Cleaning reagents 21. Detergents 22. Sanitizers 23. Sterilant 24. Preparation of cleaning reagents 25. Types of food plant soils 26. Methods of cleaning 27. Cleaning in place 28. Cleaning out of place 29. Cleaning equipment 30. Food plant surfaces 31. Documentation of cleaning 32. Cleaning schedule 33. Material safety data sheet | * Practical assessment * Project * Written tests * Portfolio of evidence * Third party Report * Oral assessment |
| 1. Sanitize food plant | * 1. Methods of sanitisation      1. Heat      2. Chemical      3. Physical   2. Sanitisation equipment   3. Documentation of sanitisation | * Practical assessment * Written tests * Third party Report * Oral assessment |
| 1. Manage food waste | * 1. Environmental legislation in Kenya      1. NEMA regulations, 2006   2. Types of food waste   3. Waste collection   4. Waste segregation   5. Waste disposal methods   6. Treatment and discharge of effluents   7. Solid waste treatment   8. Documentation of waste management | * + Practical assessment   + Project   + Portfolio of evidence   + Third party report   + Written tests * Oral assessment |
| 1. Control environmental pollution | * 1. Environmental legislation in Kenya      1. Environmental Management and Coordination Act, 1999.      2. KFS Act 2015      3. Article 69(2) of the Constitution of Kenya      4. Toxic and hazardous chemicals and materials management Regulations 2019   2. Environmental hazardous waste      1. Explosives      2. Flammable liquids      3. Flammable solids and substances      4. Oxidizing substances and organic peroxides      5. Toxic and infectious substances      6. Radioactive materials      7. Corrosive substances   3. Storage of hazardous waste   4. Disposal of hazardous waste   5. Pollutants      1. Water pollutants      2. Noise pollutants      3. Land pollutants      4. Air pollutants   6. Control of environmental pollutants | * + Practical assessment   + Project   + Portfolio of evidence   + Third party report   + Written tests * Oral assessment |
| 1. Use resources sustainably | * 1. Food plant resources   2. Water   3. Energy   4. Resource usage   5. Resource usage monitoring   6. Resource wastage minimization   7. Resources reuse   8. Resources recycle   9. Quality control improvement   10. Process monitoring   11. Optimization of resources   12. Environmental conservation measures   13. Green energy technologies   14. Tree planting   15. Public awareness and sensitization   16. Waste management   17. Ecosystem’s conservation   18. Energy conservation | * + Practical assessment   + Project   + Portfolio of evidence   + Third party report   + Written tests   + Oral assessment |

**Suggested Methods of Instructions**

* Practical
* Industrial visit
* Demonstration
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Personal protective equipment | * Lab Coats * Safety Goggles * Gloves * Ear muffs | 25 each | 1:1 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 1 | 1:25 |
|  | Lab Benches/Workstations | Permanent lab benches | Adequate for 25 trainees | 1:25 |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
| 1. **Consumable materials** | | | | |
|  | Detergents | Food grade detergents | 20 L | 1:2 |
|  | Cleaning and sanitizing equipment | Brushes  Scrubbers  Squeegees  Abrasives  Sterile swabs | 15 items each | 1:4 |
|  | Cleaning reagents | * 5L Lye * 5L Nitric acid * 5L Phosphoric acid | 5 L each | 1:5 |
|  | Chemical sanitizers | QAC  Hydrogen peroxide Iodophors  Sodium Hypochlorite | 20 L Each | 1:3 |
| 1. **Tools and equipment** | | | | |
|  | Cleaning systems | CIP system | 1 | 1:25 |
| COP system | 5 | 1:5 |
|  | Sterilization equipment | UV sterilizer | 1 | 1:25 |
| Steam gun | 1 | 1:25 |

**DAIRY PRODUCTS PROCESSING**

**ISCED UNIT CODE:** 0721 451 04A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Process Dairy Products**

**Duration of Unit:** 160 Hrs

**Unit Description**

This unit specifies the competencies required to process dairy products. It involves milk quality testing, pasteurizing raw milk and processing fermented, ice-cream, and concentrated milk products.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Perform raw milk quality test | 30 |
| 2. | Pasteurize raw milk | 45 |
| 3. | Process fermented milk products | 45 |
| 4. | Process ice-cream | 30 |
| **Total** | | **160** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | Content | **Suggested Assessment Methods** |
| * 1. Perform raw milk quality tests | 1. Composition of milk 2. Physio chemical of properties milk 3. Microbiology of milk 4. Milk quality tests 5. Organoleptic tests 6. Colour 7. Odour 8. Foreign material 9. Taste 10. Chemical tests 11. Acidity test 12. Phosphatase test 13. Butterfat test 14. Alcohol test 15. Methylene blue test 16. Resazurin test 17. Antimicrobial Test 18. Mycotoxin Test 19. Lactometer test 20. Microbial tests 21. Total Plate Count 22. E coli 23. Coliform counts | * Practical assessment * Portfolio of evidence * Third party report * Written tests * Oral assessment |
| * 1. Pasteurise raw milk | * 1. Pasteurisation of milk      1. Low temperature long time (LTLT)      2. High temperature short time (HTST)      3. Energy conservation   2. Milk pasteurisation equipment      1. Batch      2. PHE      3. Tubular   3. Monitoring pasteurisation parameters      1. pH      2. Temperature      3. Time      4. Pressure   4. Cooling methods for pasteurised milk   5. Pasteurised milk analysis   6. Packaging of pasteurised milk   7. Documentation of pasteurisation | * Practical assessment * Portfolio of evidence * Third party report * Written tests * Oral assessment |
| * 1. Process fermented milk products | 1. Types of fermented milk products: 2. Cheese, 3. Yoghurt 4. Sour milk 5. Sour cream 6. Kefir 7. Types of fermented milk processing equipment 8. Fermented milk product processing: 9. Heat treatment, 10. Fermentation, 11. Packaging 12. Fermented milk final product analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| * 1. Process non-fermented dairy products | 1. Examples of non-fermented milk products: ice cream, butter, ghee 2. Types of non-fermented milk product equipment: 3. Churner 4. Cream separator 5. Ice cream maker 6. Non-fermented milk product processing: 7. Cream separation 8. Churning 9. Freezing 10. Packaging 11. Non-fermented milk final product analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| * 1. Process concentrated milk | 1. Examples of concentrated milk products: 2. Sweetened 3. Condensed milk 4. Evaporated milk 5. Milk powder 6. Types of concentrated milk products equipment: evaporators, spray driers 7. Concentrated milk product processing: 8. Evaporation 9. Concentration 10. Instantization 11. Seeding 12. Concentrated milk final product analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Instruction**

* Practical
* Projects
* Industrial Visit
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Personal protective equipment | * Lab Coats * Safety Goggles * Gloves * Ear muffs * Gumboots | 25 each | 1:1 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 2 | 1:25 |
|  | Lab Benches/Workstations | Permanent lab benches | Adequate for 25 trainees | 1:25 |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
| 1. **Consumable materials** | | | | |
|  | Packaging equipment | Polyethylene wraps  Tubs and tumblers  Tin free steel cans | 10 each | 1:3 |
| 1. **Tools and equipment** | | | | |
|  | Cleaning systems | CIP system | 1 | 1:25 |
| COP system | 5 | 1:5 |
|  | Sterilization equipment | UV sterilizer | 1 | 1:25 |
| Steam gun | 1 | 1:25 |
|  | Color measuring equipment | Colour charts  Colorimeter | 10  5 | 1:3  1:5 |
|  | Milk quality testing equipment | Milk pouch filler  Milk dippers  Can plungers  Water bath  Lactometer  Alcohol gun  Butyrometer  Antibiotic kits  Resazurin kit  Methylene blue kit  Cryoscope  Lactoscanner  Mycotoxin test kit | 5 each | 1:5 |
|  | Fluid milk processing | Aluminium cans (assorted)Milk chiller  Milk dumper  Cream Separator  Homogenizer  Batch pasteurizer  Continuous pasteurizer | 1 equipment each | 1:25 |
|  | Yoghurt processing equipment | Batch Vat  Fermenters  Yoghurt filling machine | 1 equipment each | 1:25 |
|  | Cheese processing equipment | Cheese vat  Cheese cutter  Cheese vacuum wrapper | 1 equipment each | 1:25 |
|  | Fat based milk products processing | Cream Separator  Ice cream maker | 1 equipment each | 1:25 |

## WORK ETHICS AND PRACTICES

**UNIT CODE:** 0417 441 05A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Apply work ethics and practices.**

**Duration of Unit:** 40 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves the ability to: conduct self-management, promote ethical work practices and values, promote teamwork, manage workplace conflicts, maintain professional and personal development, apply problem-solving, and promote customer care.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Apply Self-Management Skills | **10** |
| 2. | Promote Ethical Practices and Values | **4** |
| 3. | Promote Teamwork | 10 |
| 4. | Maintain Professional and Personal Development | 10 |
| 5. | Apply Problem-Solving Skills | 4 |
| 6. | Promote Customer Care | 2 |
| **Total** | | **40** |

**Learning Outcomes, Content, and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Apply Self-Management Skills | 1. Self-awareness 2. Formulating personal vision, mission, and goals 3. Healthy lifestyle practices 4. Strategies for overcoming work challenges 5. Emotional intelligence 6. Coping with Work Stress. 7. Assertiveness versus aggressiveness and passiveness 8. Developing and maintaining high self-esteem 9. Developing and maintaining positive self-image 10. Time management 11. Setting performance targets 12. Monitoring and evaluating performance targets | * Written assessment * Third party reports * Portfolio of evidence * Project * Practical * Oral assessment |
| 1. Promote Ethical Work Practices And Values | 1. Integrity 2. Core Values, ethics and beliefs 3. Patriotism 4. Professionalism 5. Organizational codes of conduct 6. Industry policies and procedures | * Written assessment * Third party reports * Portfolio of evidence * Project * Practical * Oral assessment |
| 1. Promote Teamwork | 1. Types of teams 2. Team building 3. Individual responsibilities in a team 4. Determination of team roles and objectives 5. Team parameters and relationships 6. Benefits of teamwork 7. Qualities of a team player 8. Leading a team 9. Team performance and evaluation 10. Conflicts and conflict resolution 11. Gender and diversity mainstreaming 12. Developing Healthy workplace relationships 13. Adaptability and flexibility 14. Coaching and mentoring skills | * Written assessment * Third party reports * Portfolio of evidence * Project * Practical * Oral assessment |
| 1. Maintain Professional and Personal Development | 1. Personal vs professional development and growth 2. Avenues for professional growth 3. Recognizing career advancement 4. Training and career opportunities 5. Assessing training needs 6. Mobilizing training resources 7. Licenses and certifications for professional growth and development 8. Pursuing personal and organizational goals 9. Managing work priorities and commitments 10. Dynamism and on-the-job learning | * Project * Practical * Written assessment * Third party reports * Portfolio of evidence * Oral assessment |
| 1. Apply Problem-Solving Skills | 1. Causes of problems 2. Methods of solving problems 3. Problem-solving process 4. Decision making 5. Creative thinking and critical thinking process in development of innovative and practical solutions | * Written assessment * Oral assessment * Third party reports * Portfolio of evidence * Project * Practical |
| 1. Promote Customer Care | 1. Identifying customer needs 2. Qualities of good customer service 3. Customer feedback methods 4. Resolving customer concerns 5. Customer outreach programs 6. Customer retention | * Written assessment * Oral assessment * Third party reports * Portfolio of evidence * Project * Practical |

**Suggested Methods of Instruction**

* Practical
* Demonstrations
* Project
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Video clips | Digital types | 25 | 1:25 |
|  | Audio tapes and CDs | Digital types | 25 | 1:25 |
|  | Flashcards | Educational flash cards | 5 | 1:5 |
|  | Flip charts | Educational flip charts | 5 | 1:5 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Smart TV | LCD | 1 | 1:25 |
| 1. **Consumable materials** | | | | |
|  | Stationary materials | Pens, pencils, papers | Enough for 25 | 1:25 |
|  | Assorted whiteboard markers | Non-permanent | Enough for 25 | 1:25 |

**FOOD PROCESSING AND PRESERVATION PRINCIPLES I**

**ISCED UNIT CODE:** 0721 541 06A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Apply food processing and preservation principles**

**Duration of Unit:** 60 Hours

**Unit Description**

This unit specifies the competencies required to apply food processing and preservation principles. It involves performing thermal preservations, performing food dehydrations and performing chemical preservations.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Perform food fermentations | 20 |
| 2. | Perform food dehydrations | 20 |
| 3. | Perform chemical preservations | 20 |
| 4. |  |  |
| **Total** | | **60** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Perform food fermentations | 1. Methods of fermentation    * 1. Homo-fermentation      2. Hetero-fermentation 2. Fermentation equipment 3. Fermented products    * 1. pickles      2. sauerkraut,      3. yoghurt,      4. bread      5. kombucha      6. alcohols | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Perform food dehydrations | 1. Methods of dehydration 2. Dehydration equipment 3. Dried food products 4. Effects of dehydration on quality of foods | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Perform chemical preservations | 1. Chemical preservation methods    * 1. curing,      2. smoking 2. Chemical additives    * 1. preservative agents,      2. use of solid food constituents e.g. sugar      3. chemical additives with functional properties      4. food colours      5. anticaking agents      6. emulsifiers      7. humectants | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
| 1. | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Flip charts |  | 10 | 1:2.5 |
|  | Manuals |  | 25 | 1:25 |
| 1. 5. | Recipe cards |  | 25 | 1:1 |
|  | Training videos |  | 5 | 1:5 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72M2** |  |  |
|  | Workshop | **72 M2** | 1 | 1:25 |
|  | **Worktables** |  |  |  |
|  | Laboratory | **72 M2** |  |  |
| **C** | **Consumable materials** | | | |
|  | Printer cartridge | Full set with different colours | 5 | 1:5 |
|  | Stationery | Printing papers. foolscaps, pens., ink | 25 | 1:1 |
|  | Internet connection | Strong enough | 240 mbps |  |
|  | Food Preservatives | Assorted | 5 | 1:5 |
|  | Curing salts | Assorted | 5 | 1:5 |
|  | Packaging materials | Assorted | 10 | 1:2.5 |
|  | Aprons and Gloves |  | 2 | 2:25 |
|  | First Aid Kits |  | 25 | 1:1 |
|  | Hydrogen peroxide | Sanitizer | 20L | 20L: 25 |
|  | Hairnets and Caps |  | 25 | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Computer | With   * + Windows/Linux/Macintosh Operating System   + Microsoft Office Software   + Google Workspace Account   + Antivirus Software | 5 pcs | 1:5 |
|  | Source of heat | Gas cooker, gas |  |  |
|  | Projector | LCD | 1 | 1:25 |
|  | Printer | Colour printer | 2 | 1:12.5 |
|  | Refractometers | Handheld | 5 | 1:5 |
|  | Meat mincer | Commercial | 5 | 1:5 |
|  | Sausage stuffing machine | Commercial | 5 | 1:5 |
|  | Baking oven | Commercial | 5 | 1:5 |
|  | Mixers | Commercial | 5 | 1:5 |
|  | Fermentation vats with thermostats | Commercial | 5 | 1:5 |
|  | Freeze driers | Commercial | 1 | 1:25 |
|  | Freezer |  | 1 |  |
|  | Refrigerator |  | 1 |  |
|  | Drying Ovens | Memmert GmbH | 5 | 1:5 |
|  | Batch Pasteurizers | Commercial | 2 | 1:12.5 |
|  | Thermometers | Food grade | 5 | 1:5 |
|  | Cutting Boards |  | 25 |  |
|  | Knives |  | 25 |  |
|  | Fire Extinguishers |  | 2 | 2:25 |

## **FRUITS AND VEGETABLES PROCESSING**

**ISCED UNIT CODE:** 0721 451 07A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Process Fruits and Vegetables Products**

**Duration of Unit:** 180 hrs

**Unit Description**

This unit specifies the competencies required to process fruits and vegetable products. It involves processing tomato products, processing fruit products, processing vegetable products, processing root and tuber products.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Process tomato products | 40 |
| 2. | Process fruit products | 40 |
| 3. | Process vegetable products | 40 |
| 4. | Process roots and tuber products | 30 |
| **Total** | | **180** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Process tomato products | 1. Tomato products 2. Ketchup 3. Paste 4. Juice 5. Jam 6. Jelly 7. Tomato sauce 8. Tomato processing equipment:    * + 1. Pulpers,        2. Evaporators 9. Raw material preparation 10. Product packaging 11. Final product analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Process fruit products | 1. Fruit products 2. Juices 3. Nectar 4. Jam 5. Jelly 6. Marmalade 7. Fruit processing equipment: 8. Evaporators 9. Pulpers 10. Fruit processing (fruit juices, nectars, jams, jelly, marmalade) 11. Raw material preparation 12. Product packaging 13. Final product analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Process vegetable products | 1. Vegetable processing (sauerkraut, pickles) 2. Vegetable processing equipment 3. Raw material preparation 4. Product packaging 5. Final product analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Process roots and tubers products | 1. Roots and tubers products 2. Crisps 3. Chips 4. Starch 5. Roots and tubers processing (French fries (chips), crisps, starch) 6. Roots and tubers processing equipment 7. Raw material preparation 8. Product packaging 9. Final product analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
| 1. | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Projector | LCD | 1 | 1:25 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72M2** | 1 | 1:25 |
|  | Laboratory | **72M2** | 1 | 1:25 |
|  | Workshop | **72M2** | 1 | 1:25 |
|  | cold room | **25M2** |  |  |
| **C** | **Consumable materials** | | | |
|  | chef knives |  | 25 | 1:1 |
|  | cutting boards |  | 25 | 1:1 |
|  | blenders |  | 5 | 1:5 |
|  | food processors |  | 5 | 1:5 |
|  | canning jars with lids |  | 25 | 1:1 |
|  | sets measuring cups and spoons |  | 25 | 1:1 |
|  | thermometers |  | 5 | 1:5 |
|  | digital scales |  | 5 | 1:5 |
|  | aprons |  | 25 | 1:1 |
|  | pairs of Cut resistant gloves |  | 25 | 1:1 |
|  | First aid kit |  | 1 | 1:25 |
| **D** | **Tools and Equipment** | | | |
|  | Juicers | Commercial | 2 | 1:13 |
|  | Pulpers | Commercial | 1 | 1:25 |
|  | commercial slicers | Commercial | 1 | 1:25 |
|  | food steamers | Commercial | 2 | 1:13 |
|  | Peelers | Commercial | 2 | 1:13 |
|  | juice pressers | Commercial | 2 | 1:13 |
|  | sorting table |  | 1 | 1:25 |
|  | Chopper | Commercial | 1 | 1:25 |
|  | stainless steel heating vessels | Commercial | 5 | 1:5 |
|  | Finisher | Commercial | 1 | 1:25 |
|  | blanching equipment | Commercial | 1 | 1:25 |
|  | drying units | Commercial | 1 | 1:25 |
|  | vacuum sealers | Commercial | 1 | 1:25 |
|  | shelving units |  | 2 | 1:13 |

## **BAKED PRODUCTS PROCESSING**

**ISCED UNIT CODE:** 0721 451 08A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Process Baked Products**

**Duration of Unit:** 150 hrs

**Unit Description**

This unit specifies the competencies required to process baked products. It involves baking bread, cakes and biscuits.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Bake Bread | 50 |
| 2. | Bake Cake | 50 |
| 3. | Bake Biscuits | 50 |
| **Total** | | **150** |

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Bake bread | 1. Introduction to bread baking 2. Types of bread Flour 3. Selection of baking flour 4. Blending ratios 5. Bread Baking ingredients    * 1. Wheat flour      2. Sorghum      3. Sour Flour      4. Oat Flour      5. Millet      6. Rice Flour      7. Wheat Bran      8. Sugar      9. Salt      10. Flavors      11. Water      12. Milk      13. Fat      14. Preservatives      15. Baking Yeast      16. Functions of ingredients in bread baking 6. Bread baking equipment    * 1. Weighing scale      2. Mixer      3. Grease proof paper      4. Baking tins      5. Baking Trays      6. Proofer      7. Oven      8. Cooling Rack      9. Bread slicer      10. Aluminium tables      11. Packaging material      12. Bread crates 7. Bread baking process    * 1. Prepare ingredients      2. Prepare yeast or sourdough for inoculation      3. Mix proper ingredients to make dough      4. Ferment      5. Re-mix dough (optional)      6. Sheet      7. Mold and pan      8. Proof      9. Bake      10. Cool      11. Pack      12. Store 8. Bread analysis    * 1. Organoleptic tests 9. Bread packaging 10. Bread dispatch | * Practical assessment * Oral assessment * Portfolio of evidence * Third party report * Written tests |
| 1. Bake cakes | 1. Types of cake flour 2. Types of cakes 3. Queen cakes 4. Madeira 5. Sponge cakes 6. Cream blocks 7. Cake Baking ingredients 8. Wheat flour 9. Sugar 10. Salt 11. Eggs 12. Flavors 13. Water 14. Milk 15. Fat 16. Baking powder 17. Functions of ingredients in cake baking 18. Cake baking process 19. Cake analysis 20. Organoleptic tests 21. Microbiological tests 22. Cake baking equipment 23. Mixer 24. Oven 25. Baking tins 26. Aluminium table 27. Cooling racks 28. Grease proof paper 29. Cake packaging 30. Cake dispatch | * Practical assessment * Oral assessment * Portfolio of evidence * Third party report * Written tests |
| 1. Bake biscuits | 1. Types of biscuit flour 2. Types of biscuits 3. Biscuit baking ingredients 4. Wheat flour 5. Oat Flour 6. Sorghum 7. Sugar 8. Salt 9. Flavours 10. Water 11. Milk 12. Margarine 13. Biscuit baking equipment 14. Mixer 15. Oven 16. Baking sheets 17. Grease proof paper 18. Cooling Racks 19. Aluminium table 20. Packaging material 21. Cartons 22. Biscuit baking process 23. Biscuit analysis 24. Bread packaging | * Practical assessment * Oral assessment * Third party report * Written tests * Portfolio of evidence |

**Suggested Methods of Instruction**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Personal protective equipment | * Lab Coats * Safety Goggles * Gloves * Ear muffs * Gumboots | 25 each | 1:1 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 2 | 1:25 |
|  | Lab Benches/Workstations | Permanent lab benches | Adequate for 25 trainees | 1:25 |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
| 1. **Consumable materials** | | | | |
|  | Packaging equipment | Polyethylene bags  Grease proof paper | 10 each | 1:3 |
| 1. **Tools and equipment** | | | | |
|  | Mixers | Vertical (planetary mixers) | 5 | 1:5 |
|  | Proofers | Vertical commercial proofers | 5 | 1:5 |
|  | Ovens | Commercial ovens | 5 | 1:5 |
|  | Baking tins | Aluminum or stainless-steel baking tins | 25 | 1:1 |
|  | Manual mixing equipment | Whiskers | 25 | 1:1 |
|  | Cooling equipment | Cooling racks | 5 | 1:5 |
|  | Slicing equipment | Bread slicer | 5 | 1:5 |

## DIGITAL LITERACY

**UNIT CODE:** 0611 451 09A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Apply Digital Literacy**

**Duration of Unit:** 40 Hours

**Unit Description**

This unit covers the competencies required to demonstrate digital literacy. It involves operating computer devices, solving tasks using the Office suite, managing data and information, performing online communication and collaboration, applying cyber security skills, and performing jobs online.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Operate computer devices | **6** |
| 2. | Solve tasks using Office suite | **14** |
| 3. | Manage data and information | **6** |
| 4. | Perform online communication and collaboration | **4** |
| 5 | Apply cybersecurity skills | **4** |
| 6 | Perform online jobs | **4** |
| 7 | Apply job entry techniques | **2** |
| **Total** | | **40** |

**Learning Outcomes, Content, and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested**  **Assessment Methods** |
| --- | --- | --- |
| 1. Operate computer devices | * 1. Meaning and importance of digital literacy   2. Functions and Uses of Computers   3. Classification of computers   4. Components of a computer system   5. Computer Hardware      1. The System Unit E.g. Motherboard, CPU, casing      2. Input Devices e.g. Pointing, keying, scanning, voice/speech recognition, direct data capture devices.      3. Output Devices e.g. hardcopy output and softcopy output      4. Storage Devices e.g. main memory e.g. RAM, secondary storage (Solid state devices, Hard Drives, CDs & DVDs, Memory cards, Flash drives      5. Computer Ports e.g. HDMI, DVI, VGA, USB type C etc.   6. Classification of computer software   7. Operating system functions   8. Procedure for turning/off a computer   9. Mouse use techniques   10. Keyboard Parts and Use Technique   11. Desktop Customization   12. File and Files Management using an operating system   13. Computer Internet Connection Options       1. Mobile Networks/Data Plans       2. Wireless Hotspots       3. Cabled (Ethernet/Fiber)       4. Dial-Up       5. Satellite   14. Computer external devices management       1. Device connections       2. Device controls (volume controls and display properties) | * Practical assessment * Project * Portfolio of evidence * Third party report * Written assessment * Oral assessment |
| 1. Solve tasks using Office suite | * + Meaning and Importance of Word Processing   + Examples of Word Processors   + Working with word document     - Open and close word processor     - Create a new document     - Save a document     - Switch between open documents   + Enhancing productivity     - Set basic options/preferences     - Help resources     - Use magnification/zoom tools     - Display, hide built-in tool bar     - Using navigation tools   + Typing Text   + Document editing (copy, cut, paste commands, spelling and Grammar check)   + Document formatting     - Formatting text     - Formatting paragraph     - Formatting styles     - Alignment     - Creating tables     - Formatting tables   + Graphical objects     - Insert object (picture, drawn object)     - Select an object     - Edit an object     - Format an object   + Document Print setup     - Page layout,     - Margins set up     - Orientation.   + Word Document Printing   + Meaning & Importance of electronic spreadsheets   + Components of Spreadsheets   + Application areas of spreadsheets   + Using spreadsheet application     - Parts of Excel screen: ribbon, formula bar, active cell, name box, column letter, row number, Quick Access Toolbar.     - Cell Data Types     - Block operations     - Arithmetic operators (formula bar (-, +, \*, /).     - Cell Referencing   + Data Manipulation     - Using Functions (Sum, Average, SumIF, Count, Max, Max, IF, Rank, Product, mode etc)     - Using Formulae     - Sorting data     - Filtering data     - Visual representation using charts   + Worksheet printing   + Electronic Presentations   + Meaning and Importance of electronic presentations   + Examples of Presentation Software   + Using the electronic presentation application     - Parts of the PowerPoint screen (slide navigation pane, slide pane, notes, the ribbon, quick access toolbar, and scroll bars).     - Open and close presentations     - Creating Slides (Insert new slides, duplicate, or reuse slides.)     - Text Management (insert, delete, copy, cut and paste, drag and drop, format, and use spell check).     - Use magnification/zoom tools     - Apply or change a theme.     - Save a presentation     - Switch between open presentations   + Developing a presentation     - Presentation views       1. Slides       2. Master slide     - Text     - Editing text     - Formatting     - Tables   + Chart     - Using charts     - Organization charts   + Graphical objects     - Insert     - manipulate     - Drawings   + Prepare outputs     - Applying slide effects and transitions     - Check and deliver     - Spell check a presentation     - Slide orientation     - Slide shows, navigation   + Print presentations (slides and handouts) | * Practical assessment * Project * Portfolio of evidence * Third party report * Written assessment * Oral assessment |
| 1. Manage Data and Information | * + Meaning of Data and information   + Importance and Uses of data and information   + Types of internet services     - Communication Services     - Information Retrieval Services     - File Transfer     - World Wide Web Services     - Web Services     - Automatic Network Address Configuration     - Newsgroup     - Ecommerce   + Types of Internet Access Applications   + Web browsing concepts     - Key concept     - Security and safety   + Web browsing     - Using the web browser     - Tools and setting     - Clearing Cache and cookies     - URIs     - Bookmarks     - Web outputs   + Web based information     - Search     - Critical evaluation of information     - Copyright, data protection   + Downloads Management   + Performing Digital Data Backup (Online and Offline)   + Emerging issues in internet | * Observation * Portfolio of Evidence * Project * Written assessment * Practical assessment * Oral assessment |
| 1. Perform online communication and collaboration | * 1. Netiquette principles   2. Communication concepts      1. Online communities      2. Communication tools      3. Email concepts   3. Using email      1. Sending email      2. Receiving email      3. Tools and settings      4. Organizing email   4. Digital content copyright and licenses   4/5 Online collaboration tools  4,5.1 Online Storage (Google Drive)   * + 1. Online productivity applications (Google Docs & Forms)     2. Online meetings (Google Meet/Zoom)     3. Online learning environments     4. Online calendars (Google Calendars)     5. Social networks (Facebook/Twitter - Settings & Privacy)   1. Preparation for online collaboration      1. Common setup features      2. Setup   2. Mobile collaboration      1. Key concepts      2. Using mobile devices      3. Applications      4. Synchronization | * Observation * Portfolio of Evidence * Project * Written assessment * Practical assessment * Oral assessment |
| 1. Apply cybersecurity skills | * 1. Data protection and privacy      1. Confidentiality of data/information      2. Integrity of data/information      3. Availability of data/information   2. Internet security threats      1. Malware attacks      2. Social engineering attacks      3. Distributed denial of service (DDoS)      4. Man-in-the-middle attack (MitM)      5. Password attacks      6. IoT Attacks      7. [Phishing Attacks](https://onlinedegrees.sandiego.edu/top-cyber-security-threats/#phishing-attacks)      8. [Ransomware](https://onlinedegrees.sandiego.edu/top-cyber-security-threats/#ransomware)   3. Computer threats and crimes   4. Cybersecurity control measures      1. Physical Controls      2. Technical/Logical Controls (Passwords, PINs, Biometrics)      3. Operational Controls   5. Laws governing protection of ICT in Kenya      1. The Computer Misuse and Cybercrimes Act No. 5 of 2018      2. The Data Protection Act No. 24 Of 2019 | * Observation * Portfolio of Evidence * Project * Written assessment * Practical assessment * Oral assessment |
| 1. Perform Online Jobs | * 1. Introduction to online working   2. Types of online Jobs   3. Online job platforms      1. Remotask      2. Data annotation tech      3. Cloud worker      4. Upwork      5. Oneforma      6. Appen   4. Online account and profile management   5. Identifying online jobs/job bidding   6. Online digital identity   7. Executing online tasks   8. Management of online payment accounts. | * Observation * Portfolio of Evidence * Project * Written assessment * Practical assessment * Oral assessment |
| 1. Apply job entry techniques | * 1. Types of job opportunities      1. Self-employment      2. Service provision      3. product development      4. salaried employment   2. Sources of job opportunities   3. Resume/ curriculum vitae      1. What is a CV      2. How long should a CV be      3. What to include in a AC      4. Format of CV      5. How to write a good CV      6. Don’ts of writing a CV   4. Job application letter      1. What to include      2. Addressing a cover letter      3. Signing off a cover letter   5. Portfolio of Evidence      1. Academic credentials      2. Letters of commendations      3. Certification of participations      4. Awards and decorations   6. Interview skills      1. Listening skills      2. Grooming      3. Language command      4. Articulation of issues      5. Body language      6. Time management      7. Honesty   7. Generally knowledgeable in current affairs and technical area | * + Observation   + Oral assessment   + Portfolio of evidence   + Third party report   + Written assessment |

**Suggested Methods Instruction**

* Practical
* Demonstrations
* Project
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Samples of CVs | Job CVs, resumes | 5 | 1:5 |
|  | Samples of job applications | Job advertisements | 5 | 1:5 |
|  | Windows/Linux/Macintosh Operating System | Up to date OS | 25 | 1:25 |
|  | Microsoft Office Software | Up to date Microsoft software | 25 | 1:25 |
|  | Google Workspace Account | Up to date workspace | 25 | 1:25 |
|  | Antivirus Software | Up to date Antivirus | 25 | 1:25 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | ICT Laboratory | 72m2 | 1 | 1:25 |
|  | Internet connection | Adequate speed |  | 1:25 |
|  | Smart board/Smart TV (Where applicable) | LED type | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | External storage media | 16 GB | 25 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
| 1. **Consumable materials** | | | | |
|  | Printing Papers | A4 | Enough for 25 | 1:25 |
|  | Assorted whiteboard markers | Non-permanent | Enough for 25 | 1:25 |

**FOOD LABORATORY PRACTICE**

**ISCED UNIT CODE:** 0721 451 10A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Perform Food Laboratory Practices**

**Duration of Unit:** 130 Hrs

**Unit Description**

This unit covers the competencies required to perform standard laboratory practices. It involves performing laboratory safety procedures, implementing OSH programs, preparing laboratory reagents and carrying out food microbiological test.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Perform laboratory safety procedure | 30 |
| 2. | Implement OSH programs | 30 |
| 3. | Prepare laboratory reagents | 30 |
| 4. | Carry out food microbiological test | 40 |
| **Total** | | **130** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Perform laboratory safety procedure | Introduction to laboratory safety procedures  Principles of Good Laboratory Practices  Types of PPEs  Lab coats  Gloves  Hair nets  Masks  Laboratory hazards  Chemical  Biological  Physical  Safety  Control of laboratory hazard and risks  Indicators for hazards  Increased incidents of accidents, injuries  Increased occurrence of sickness or health complaints/ symptoms  Common complaints of workers related to OSH  High absenteeism for work-related reasons  Risk assessments  Health Audit  Safety Audit  Work Safety and Health Evaluation  Work Environment Measurements of Physical and Chemical Hazards  Emergency procedures and preparedness for risk management  Fire drill  Earthquake drill  Basic life support  First aid  Spillage control  Decontamination of chemical and toxic  Disaster preparedness/management  Use of fire-extinguisher  Laboratory wastes management  Glassware  Food samples  Gloves  Chemicals  Waste reduction and disposal  Documentation of hazards, risk assessment and mitigation  Medical/Health records  Incident/accident reports  Sickness notifications/sick leave application  OSH-related trainings obtained | Practical test  Portfolio of evidence  Written tests  Third party report  Oral questioning |
| 1. Implement OSH programs | Workplace safety programs  OSH 2007  Training methods on OSH programs  Visuals  Demonstration  Audio-visuals  Peer trainings  OSH related records  Medical/Health records  Incident/accident reports  Sickness notifications/sick leave application  OSH-related trainings obtained | Practical test  Portfolio of evidence  Written tests  Third party report  Oral questioning |
| 1. Prepare laboratory reagents | Personal protective equipment  Gloves  Goggles  Laboratory overcoat  Laboratory equipment and apparatus  Laboratory reagents  Acids  Bases  Salts  Indicators  Distilled water  Concentration of solutions: molarity, normality.  Methods of laboratory reagent preparation such as standardization, dilution. | Practical test  Portfolio of evidence  Written tests  Third party report  Oral questioning |
| 1. Carry out food microbiological test | Introduction to general micro-organisms  Classification of micro-organisms  Factors influencing the growth of micro-organisms  Sampling procedures  Laboratory apparatus and equipment  Culture and media preparation  Culturing methods  Enumeration of micro-organisms  Interpretation and documentation of microbiological tests results | Practical test  Portfolio of evidence  Written tests  Third party report  Oral questioning |

**Suggested Methods of Delivery**

Practical

Projects

Demonstrations

Group discussion

Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| **Learning materials** | | | | |
|  | Personal protective equipment | Lab Coats  Safety Goggles  Gloves  Ear muffs | 1 each per trainee | 1:1 |
| **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:1 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 1 | 1:25 |
|  | Lab Benches/Workstations | Permanent lab benches | Adequate for 25 trainees | - |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
|  | Disposal Containers | Sharps such as glass, needles, etc.) | 5 | 1:5 |
| **Consumable materials** | | | | |
|  | Printing Papers | A4 | Enough for 25 | 1:25 |
|  | Assorted whiteboard markers | Non-permanent | Enough for 25 | 1:25 |
|  | Cleaning materials | Detergents  Chemical sanitizers  Running water | Enough for 25 | 1:25 |
| **Tools and equipment** | | | | |
|  | Weighing balances | Analytical mass balance | Enough for 25 | 1:25 |
|  | Soxhlet apparatus | Standard soxhlet apparatus | 4 | 1:7 |
|  | pH meters | Electrode type pH meters | 5 | 1:5 |
|  | UV-VIS spectrophotometer | Double spectrum | 1 | 1:25 |
|  | Bench top colorimeter | Lovibond comparator | 4 | 1:7 |
|  | Refractometers | Hand -held | 5 | 1:5 |
|  | Kjedahl apparatus | Complete Kjedahl apparatus setup | 1 | 1:25 |
|  | Oven | Air type (forced convection) | 4 | 1:7 |
|  | Oven | Vacuum | 4 | 1:7 |
|  | Water baths | General purpose | 10 | 1:3 |
|  | Fume chambers | Ducted fume chamber | 2 | 1:13 |
|  | Moisture analyzers | Rapid infrared | 4 | 1:7 |
|  | Lamina hood | Vertical and horizontal laminar hoods | 1 | 1:25 |
|  | Autoclave | Laboratory autoclaves | 1 | 1:25 |
|  | Colony counter | Manual | 1 | 1:25 |
|  | Anaerobic jar | Vacuum anaerobic type | 1 | 1:25 |
|  | Incubator | Bench top | 1 | 1:25 |
|  | Sterile blender jars | Steel type | 5 | 1:5 |
|  | Microscopes | Light microscopes | 5 | 1:5 |
|  | Storage equipment for samples | Fridge  Freezer | 1 each per trainee | 1:1 |
|  | Heating equipment | Hot Plates  Heating Mantles | 10 | 1:3 |
|  | Stirring Hot Plates | Magnetic Stirred | 10 |  |
|  | Laboratory apparatus | Micropipettes  Graduated Pipettes  Pipette Tips  Beakers  Flasks (Erlenmeyer or volumetric):  Graduated Cylinders  Test Tubes  Test Tube Racks  Measuring Scoops/Spatulas  Glass Stirring Rods  Funnels  Watch Glasses  Droppers  Burettes  Burette Stands  Petri Dishes  Filter Paper  Centrifuge  Centrifuge Tubes  Separatory Funnels  Wash Bottles  Forceps/Tweezers  Tongs | 1 each per trainee | 1:1 |

**CONFECTIONERIES PROCESSING**

**ISCED UNIT CODE:** 0721 451 11A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency**: Process Confectioneries**

**Duration of Unit:** 150 hrs

**Unit Description**

This unit specifies the competencies required to process confectioneries. It involves processing candies, highly boiled sweets and fondants.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Process candies | 50 |
| 2. | Process high boiled sweets | 50 |
| 3. | Process fondants | 50 |
| **Total** | | **150** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| * 1. Process candies | * 1. Introduction to sugar confectioneries   2. Types of candies   3. Caramels   4. Chocolates   5. Hard boiled sweets   6. Fondants   7. Toffees   8. Candies ingredients   9. Water   10. Dextrose   11. Fat   12. Emulsifiers   13. Raw chocolate   14. Gums   15. Sugar   16. Colorants   17. Flavour   18. Candies processing   19. Candies analysis   20. Candies packaging | * Practical assessment * Oral assessment * Portfolio of evidence * Third party report * Written tests |
| * 1. Process high boiled sweets | * 1. High boiled sweets ingredients      1. Water      2. Dextrose      3. Fat      4. Emulsifiers      5. Gums      6. Sugar/ Syrup      7. Colorants      8. Flavourings   2. High boiled sweets processing   3. High boiled sweets analysis   4. High boiled sweets packaging | * Practical assessment * Oral assessment * Portfolio of evidence * Third party report * Written tests |
| * 1. Process fondants | * 1. Fondant ingredients      1. Water      2. Gelatin      3. Glycerine      4. Vegetable oil/shortening      5. Sugar/Syrup      6. Colour      7. Flavour   2. Fondant processing   3. Fondant analysis   4. Fondant packaging | * Practical assessment * Oral assessment * Portfolio of evidence * Third party report * Written tests |

**Suggested Methods of Instructions**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio(item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Personal protective equipment | 1. Lab Coats 2. Safety Goggles 3. Gloves 4. Ear muffs 5. Gumboots | 25 each | 1:1 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 2 | 1:25 |
|  | Lab Benches/Workstations | Permanent lab benches | Adequate for 25 trainees | 1:25 |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
| 1. **Consumable materials** | | | | |
|  | Packaging equipment | Polyethylene paper  Waxed paper  Parchment paper wrappers | 3 rolls | 1:8 |
|  | Ingredients and Additives | Dextrose | 15 kg | 1:3 |
| Raw chocolate | 5kg | 1:5 |
| Vegetable oil/ Shortening | 3kg | 1:8 |
| Emulsifiers | 1kg | 1:25 |
| Gums | 1kg | 1:25 |
| Sugar/Syrup | 25 kg | 1:1 |
| Colorants | 1 kg | 1:25 |
| Flavour | 1 kg | 1:25 |
| 1. **Tools and equipment** | | | | |
|  | Food grade thermometer | Candy thermometer | 25 | 1:1 |
|  | Heating vessels | Stainless steel heating vessels | 25 | 1:1 |
|  | Molding equipment | Candy Moulds | 10 | 1:3 |
|  | Mixers | Electric mixer | 5 | 1:5 |
| Manual mixer (whisking equipment) | 25 | 1:1 |
|  | Cutting equipment | Spatula, cutters | 25 | 1:1 |
|  | Evaporator | Batch open type evaporator | 1 | 1:25 |

**MEAT PRODUCTS PROCESSING**

**ISCED UNIT CODE:** 0721 451 12A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Process meat products**

**Duration of Unit:** **120hours**

**Unit description:**

This unit specifies the competencies required to process meat products. It involves processing beef, fish and poultry products.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Process beef products | 40 |
| 2. | Process fish products | 40 |
| 3. | Process poultry products | 40 |
| **Total** | | **120** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| * + - 1. Process beef products | 1.1 Ingredients for beef products processing   * 1. Beef products processing   2. Analysis of beef products   3. Packaging of beef products   4. Beef products plant cleaning | * Administration of written tests * Observation of beef products processing and cleaning process * Administration of practical tests |
| * + - 1. Process fish products | * 1. Preparation for fish products Processing   2. Ingredients for fish products processing   3. Fish products processing   4. Analysis of fish products   5. Packaging of fish products   6. Fish products plant cleaning | * Administration of written tests * Observation of fish products processing and cleaning process * Administration of practical tests |
| * + - 1. Process poultry products | * 1. Preparation for poultry products processing   2. Ingredients for poultry products processing   3. Poultry products processing   4. Analysis of poultry products   5. Packaging of poultry products   6. Poultry products plant cleaning | * Administration of written tests * Observation of poultry products processing and cleaning process * Administration of practical tests |

**Suggested Methods of Delivery:**

* Direct instruction
* Project
* Video clips
* Field trips
* Discussions
* Demonstration by trainer
* Practice by the trainee
* Industrial attachment

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Projector | LCD | 1 | 1:25 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72 m2** | 1 | 1:25 |
|  | Food workshop | **72 m2** | 1 | 1:25 |
|  | Food microbiological laboratory | **72 m2** | 1 | 1:25 |
|  | Food chemistry laboratory |  | 1 | 1:25 |
|  | Cold room | **22 m2** | 1 | 1:25 |
|  |  |  |  |  |
| **C** | **Consumable materials** | | | |
|  | Artificial casings |  | 5 | 1:5 |
|  | Curing salts | (enough) | Various |  |
|  | Microbiological Test Kits |  | 5 | 1:5 |
|  | Meat |  | 10kg | 10:25 |
| **D** | **Tools and Equipment** | | | |
|  | Water bath |  | 5 | 1:5 |
|  | Food-grade thermometers |  | 5 | 1:5 |
|  | aprons/ white lab coats |  | 25 | 1:25 |
|  | First aid kit |  | 1 | 1:25 |
|  | Mincer /meat grinder |  | 5 | 1:5 |
|  | Sausage filler |  | 1 | 1:25 |
|  | Bowl chopper |  | 2 | 1:13 |
|  | Vacuum packaging equipment |  | 1 | 1:25 |
|  | Smoking chamber |  | 1 | 1:25 |
|  | 4 Baking oven |  | 5 | 1:5 |
|  | Freezers |  | 5 | 1:5 |
|  | 1 UV sterilisers |  | 1 | 1:25 |
|  | 5 meat hooks | Stainless steel | 5 | 1:5 |
|  | Dehydrator | Commercial | 1 | 1:25 |
|  | Bone Saw |  | 1 | 1:25 |
|  | Handwashing Stations |  | 2 | 1:12.5 |
|  | Sanitizing Station | Automatic | 2 | 1:12.5 |
|  | Honing Steel and Sharpeners |  | 10 | 1:12.5 |
|  | Boning Hooks | For handling larger cuts of meat. | 5 | 1:5 |
|  | Meat Mallets |  | 5 | 1:5 |
|  | Water Activity Meter |  | 5 | 1:5 |
|  | Carts and Trolleys |  | 1 | 1:25 |
|  | Storage Racks |  | 5 | 1:5 |
|  | Fire extinguishers |  | 5 | 1:5 |
|  | Baking tins | Stainless steel | 10 | 1:12.5 |
|  | Captive bolt stunning gun |  | 1 | 1:12 |
|  | Butcher Knives | (Various Types) | 10 | 1:12.5 |
|  | Cutting Boards |  | 10 | 1:12.5 |

## ENTREPRENEURIAL SKILLS

**UNIT CODE:** 0413 541 13A

**Relationship to occupational standards**

This unit addresses the unit of competency: **Apply Entrepreneurial skills.**

**Duration of unit:** 40 hours

**Unit Description:**

This unit covers the competencies required to demonstrate an understanding of entrepreneurship. It involves demonstrating an understanding of financial literacy, applying entrepreneurial concepts identifying entrepreneurship opportunities, applying business legal aspects, and developing business innovative strategies and business plans.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Apply Financial Literacy | **6** |
| 2. | Apply the Entrepreneurial Concept | **4** |
| 3. | Identify Entrepreneurship Opportunities | **6** |
| 4. | Apply Business Legal Aspects | **6** |
| 5 | Innovate Business Strategies | **6** |
| 6 | Develop A Business Plan | **12** |
| **Total** | | **40** |

**Learning Outcomes, Content and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Apply Financial Literacy | 1. Personal finance management 2. Balancing between needs and wants 3. Budget Preparation 4. Saving management 5. Factors to consider when deciding where to save 6. Debt management 7. Factors to consider before taking a loan 8. Investment decisions 9. Types of investments 10. Factors to consider when investing money 11. Insurance services 12. insurance products available in the market 13. Insurable risks | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 2.Apply Entrepreneurial Concept | 1. Difference between Entrepreneurs and Business persons 2. Types of entrepreneurs 3. Ways of becoming an entrepreneur 4. Characteristics of Entrepreneurs 5. salaried employment and self-employment 6. Requirements for entry into self-employment 7. Roles of an Entrepreneur in an enterprise 8. Contributions of Entrepreneurship | * Project * Written assessment * Oral assessment * Third party report |
| 3.Identify Entrepreneurship Opportunities | 1. Sources of business ideas 2. Factors to consider when evaluating business opportunity 3. Business life cycle | * Project * Written assessment * Oral assessment * Third party report |
| 4.Apply Business Legal Aspects | * 1. Forms of business ownership   2. Business registration and licensing processing   3. Types of contracts and agreements   4. Employment laws   5. Taxation laws | * Project * Written assessment * Oral assessment * Third party report |
| 5.Innovate Business Strategies | * 1. Creativity in business\   2. Innovative business strategies   3. Entrepreneurial Linkages   4. ICT in business growth and development | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 6.Develop Business Plan | * 1. Business description   2. Marketing plan   3. Organizational/Management   Plan   * 1. Production/operation plan   2. Financial plan   3. Executive summary   4. Business plan presentation   5. Business idea incubation | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Instruction**

* Practical
* Demonstrations
* Project
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | samples of documents | CVs , job applications, Business plan templates | 5 each | 1:5 |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Journals |  | 10 | 1:2.5 |
|  | Case studies examples |  | 5 | 1:5 |
|  | News papers |  | 5 | 1:5 |
| 1. **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72M2** |  |  |
| 1. **C** | **Consumable materials** | | | |
|  | Printer cartridge | Full set with different colours | 5 | 1:5 |
|  | Stationery | Printing papers. foolscaps, pens., ink | 25 | 1:1 |
|  | Internet connection | 240mbps | 1 | 1:25 |
| 1. **D** | **Tools and Equipment** | | | |
|  | Computer | With   * + Windows/Linux/Macintosh Operating System   + Microsoft Office Software   + Google Workspace Account   + Antivirus Software | 25 pcs | 1:1 |
|  | Projector | LCD | 1 | 1:25 |
|  | printer | Colour printer | 2 | 1:12.5 |

## **STANDARD FOOD LABORATORY TECHNIQUES**

**ISCED UNIT CODE:** 0721 551 14A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Perform Standard Food Laboratory Techniques.**

**Duration of Unit:** **60 Hours**

**Unit Description**

This unit covers the competencies required to perform standard laboratory techniques biochemical tests, instrumental analysis and proximate analysis.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Carry out biochemical tests | **20** |
| 2. | Carry out instrumental analysis | **20** |
| 3. | Carry out proximate analysis | **20** |
| **Total** | | **60** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Carry-out biochemical tests | * 1. Catalase Test:   2. Oxidase Test:   3. Nitrate Reduction Test:   4. Triple Sugar Ion (TSI) Test:   5. Methyl Red and Vogus Proskauer (MRVP) Test   6. Coagulase Test   7. Urease Test   8. Carbohydrate fermentation test | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Carry out instrumental analysis test | 1. Spectrophotometry   2.1.1 Atomic Absorption spectrophotometry  2.1.2 Flame photometry  2.1.3 Colorimetry  2.1.4 UV spectrophotometry  2.2 Chromatography  2.3 Refractometry  2.4 Polarimetry  2.5 Rheology  2.6 Densimetry | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Carry out proximate analysis | 3.1 Principles of food chemistry  3.1.1 Macro-molecules in food  3.1.2 Micro-molecules in food  3.2 Laboratory apparatus and equipment preparation  3.3 Sampling procedures  3.4 Proximate analysis  3.4.1 Moisture Content  3.4.2 Crude Protein  3.4.3 Crude Fat  3.4.4 Crude Ash  3.4.5 Crude Fiber  3.4.6 Carbohydrates  3.4.7 Vitamins  3.5 Interpretation and documentation of proximate results | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Flip charts |  | 10 | 1:2.5 |
|  | Manuals |  | 25 | 1:25 |
|  | Recipe cards |  | 25 | 1:1 |
|  | Training videos |  | 5 | 1:5 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | 72M2 |  |  |
|  | Workshop | 72 M2 | 1 | 1:25 |
|  | Laboratory | 72 M2 |  |  |
| **C** | **Consumable materials** | | | |
|  | Cleaning materials |  |  |  |
|  | Personal protective equipment | Lab Coats Safety Goggles: Gloves Ear muffs | 25 sets | 1:25 |
|  | Pipettes | Micropipettes (1-10 μL, 10-100 μL, 100-1000 μL): 10 sets (each set contains 3 different sizes for group use) | 25 each | 1:1 |
|  | Graduated Pipettes (1 mL, 5 mL, 10 mL): 20 (shared between groups) | 25 each | 1:1 |
|  | Pipette Tips: 500-1000 tips (various sizes, shared) | 25 each | 1:1 |
|  | Beakers 50 (shared between pairs/groups) | (100 mL, 250 mL, 500 mL): | 100 each | 4:1 |
|  | Flasks (Erlenmeyer or volumetric) | 100 mL, 250 mL, 500 mL: 25 each size (one per trainee, per experiment) | 100 each | 4:1 |
|  | Graduated Cylinders | (10 mL, 50 mL, 100 mL): | 25 each | 1:1 |
|  | Test Tubes | (16 mm x 150 mm): | 200 | to ensure enough for multiple experiments |
|  | Test Tube Racks: |  | 25 | 1:1 |
|  | Measuring Scoops/Spatulas |  | 25 | 1:1 |
|  | Glass Stirring Rods |  | 25 | 1:1 |
|  | Funnels | 100 mm | 25 | 1:1 |
|  | Watch Glasses | 100mm | |  |  | | --- | --- | | 25 | 1:1 | | 1:1 |
|  | Droppers |  | 25 | 1:1 |
|  | Burettes | (50 mL) | 25 | 1:1 |
|  | Burette Stands | Complete | 25 | 1:1 |
|  | Petri Dishes: |  | 50 | 2:1 |
|  | Filter Paper: | (various sizes, shared) | 100 | 4:1 |
|  | Centrifuge: |  | 1 | 1:25 |
|  | Centrifuge Tubes |  | 50 | 2:1 |
|  | Separating funnels | (250 mL, 500 mL): (shared for liquid-liquid extractions) | 25 | 1:1 |
|  | Wash Bottles (500 mL) |  | 25 | 1:1 |
|  | Cleaning Brushes |  | 10 |  |
|  | Stirring Hot Plates with Magnetic Stirrers: |  | 10 | 1:2.5 |
|  | Magnifying Glasses: |  | 10 | 1:2.5 |
|  | Forceps/Tweezers: |  | |  |  | | --- | --- | | 25 | 1:1 | | 1:1 |
|  | Glass Markers/Labels | (one per trainee for labeling samples) | 25 | 1:1 |
|  | First aid kit |  | 1 |  |
| **D** | **Tools and Equipment** | | | |
|  | Soxhlet apparatus |  | 5 | 1:5 |
|  | Heating Mantles: | for heating liquids in flasks, shared | 5 | 1:5 |
|  | Hot Plates: | (shared between groups) | 10 | 1:2.5 |
|  | pH meters |  | 5 | 1:5 |
|  | UV-Vis spectrophotometer |  | 1 | 1:25 |
|  | Lovibond comparator |  | 5 | 1:5 |
|  | Refractometers | (hand-held) | 5 | 1:5 |
|  | Kjedahl apparatus |  | 1 | 1:25 |
|  | Air Oven | Memmert GmbH | 5 | 1:5 |
|  | Vacuum oven | Memmert GmbH | 5 | 1:5 |
|  | Water baths |  | 10 |  |
|  | Fume chambers |  | 2 |  |
|  | Rapid moisture analyzers |  | 5 | 1:5 |
|  | Muffle furnace | Memmert GmbH | 1 | 1:25 |
|  | Weighing balance | 0.001g sensitivity | 5 | 1:5 |
|  | Lamina hood |  | 1 | 1:25 |
|  | Autoclave |  | 1 | 1:25 |
|  | Colony counter |  | 1 | 1:25 |
|  | Anaerobic jar |  | 1 | 1:25 |
|  | Incubator |  | 1:25 | 1:25 |
|  | Sterile blender jars |  | 5 | 1:5 |
|  | Microscopes |  | 5 | 1:5 |
|  | Storage Cabinets |  | 5 | 1:5 |
|  | Fridge |  | 1 | 1:25 |
|  | Freezer |  | 1 | 1:25 |
|  | First aid kit |  | 1 | 1:25 |
|  | Stopwatches |  | 25 | 1:1 |
|  | Training kits for OSHA |  | 5 | 1:5 |
|  | Visual Boards |  | 5 | 1:5 |
|  | Desiccators: | (shared for drying materials) | 5 | 1:5 |
|  | Tongs |  | 25 | 1:1 |
|  | Waste Containers (for solid and liquid waste) | (for hazardous and non-hazardous waste, shared) | 5 | 1:5 |
|  | Sharps Disposal Containers: | 3 (for safe disposal of glass, needles, etc.) | 3 | 1:25 |
|  | Computers/Tablets | (shared for data recording and analysis) | 5 | 1:5 |
|  | Printers | (for printing experiment data and reports) | 1 | 1:5 |

## FOOD PROCESSING AND PRESERVATION PRINCIPLES II

**UNIT CODE:** **0721 551 15A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Apply food processing and preservation principles**

**Duration of Unit:** **100 Hours**

**Unit Description**

This unit covers the competencies required to apply food processing and preservation principles. It involves performing thermal preservations and unit operations.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Perform thermal preservations | 40 |
| 2. | Perform Unit operations | 40 |
| 3. | Perform Food preservation principles | 20 |
| 4. | Perform thermal preservations | 40 |
| **Total** | | **100** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| Perform thermal preservations | 1. Constituents of food: water, PH Acidity, macronutrients, micronutrients 2. Classification of food: based on PH, nutritive profile 3. Factors affecting microbial growth (PH, nutrient source) 4. Thermal preservation methods    * 1. Blanching      2. Retorting      3. Pasteurization      4. Low temperature preservation      5. Freezing      6. Chilling      7. Refrigeration | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| Perform unit operations | * 1. Filtration and membrane separation      1. Filtration principles      2. Filtration and membrane separation equipment      3. Evaporation      4. Mixing      5. Homogenization      6. Emulsification      7. Centrifugation      8. Solid-Liquid extraction and pressing      9. Size reduction      10. Application | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| Perform Food preservation principles | 1. Pickling principle 2. Salting principles 3. Chemical preservation 4. Vacuum sealing 5. Irradiation 6. Smoking 7. Dehydration | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Flip charts |  | 10 | 1:2.5 |
|  | Manuals |  | 25 | 1:25 |
|  | Recipe cards |  | 25 | 1:1 |
|  | Training videos |  | 5 | 1:5 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72M2** |  |  |
|  | Workshop | **72 M2** | 1 | 1:25 |
|  | **Worktables** |  |  |  |
|  | Laboratory | **72 M2** |  |  |
| **C** | **Consumable materials** | | | |
|  | Printer cartridge | Full set with different colours | 5 | 1:5 |
|  | Stationery | Printing papers. foolscaps, pens., ink | 25 | 1:1 |
|  | Internet connection | Strong enough | 240 mbps |  |
|  | Food Preservatives | Assorted | 5 | 1:5 |
|  | Curing salts | Assorted | 5 | 1:5 |
|  | Packaging materials | Assorted | 10 | 1:2.5 |
|  | **Aprons and Gloves** |  | 2 | 2:25 |
|  | **First Aid Kits** |  | 25 | 1:1 |
|  | **Hydrogen peroxide** | Sanitiser | 20L | 20L: 25 |
|  | **Hairnets and Caps** |  | 25 | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Computer | With   * + Windows/Linux/Macintosh Operating System   + Microsoft Office Software   + Google Workspace Account   + Antivirus Software | 5 pcs | 1:5 |
|  | Source of heat | Gas cooker, gas |  |  |
|  | Projector | LCD | 1 | 1:25 |
|  | printer | Colour printer | 2 | 1:12.5 |
|  | Refractometers | Handheld | 5 | 1:5 |
|  | Meat mincer | Commercial | 5 | 1:5 |
|  | Sausage stuffing machine | Commercial | 5 | 1:5 |
|  | Baking oven | Commercial | 5 | 1:5 |
|  | Mixers | Commercial | 5 | 1:5 |
|  | Fermentation vats with thermostats | Commercial | 5 | 1:5 |
|  | Freeze driers | Commercial | 1 | 1:25 |
|  | **Freezer** |  | 1 |  |
|  | **Refrigerator** |  | 1 |  |
|  | Drying Ovens | Memmert GmbH | 5 | 1:5 |
|  | Batch Pasteurizers | Commercial | 2 | 1:12.5 |
|  | Thermometers | Food grade | 5 | 1:5 |
|  | **Cutting Boards** |  | 25 |  |
|  | **Knives** |  | 25 |  |
|  | **Fire Extinguishers** |  | 2 | 2:25 |

## **BEVERAGE PRODUCTS PROCESSING**

**ISCED UNIT CODE: 0721 551 16A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Process Beverage products**

**Duration of Unit: 120 Hours**

**Unit Description:**

This unit specifies the competencies required to process beverage products. It involves processing alcoholic beverages, non-alcoholic beverages and carbonated soft drinks

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Process alcoholic beverages | 50 |
| 2. | Process non- alcoholic beverages | 50 |
| 3. | Process carbonated soft drinks | 20 |
| **Total** | | **120** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Process alcoholic beverages | * 1. Alcoholic beverages      1. Beer      2. Wine      3. Spirits   2. Alcoholic beverages ingredients      1. Yeast      2. Water      3. Malted barley      4. Hops      5. Fruits      6. Sugar   3. Beer processing      1. malting,      2. milling,      3. mashing,      4. extract separation,      5. hop addition and boiling,      6. removal of hops and precipitates,      7. cooling and aeration,      8. fermentation,      9. separation of yeast from young beer, aging,      10. maturing,      11. packaging   4. Wine processing      1. crushing,      2. pressing,      3. fermentation,      4. clarification, and      5. Aging/bottling.   5. Spirits processing      1. Raw material      2. Preparation of mash      3. Distillation      4. Maturation      5. Bottling and packing   6. Alcoholic beverages analysis | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Process non- alcoholic beverages | * 1. Non-alcoholic beverages      1. Tea      2. Coffee      3. Cocoa   2. Black Tea processing      1. Raw material      2. Withering      3. Fermentation      4. Oxidation      5. Drying      6. Classification      7. Packaging   3. Green tea processing      1. Raw material      2. steaming/roasting      3. primary heating and rolling,      4. rolling,      5. secondary rolling      6. drying      7. refining      8. firing      9. sorting      10. Packing.   4. Coffee processing      1. Harvesting      2. Separation      3. Processing and drying of cherries      4. Hulling and polishing      5. Cleaning, sorting and grading      6. Roasting      7. Grinding and extraction      8. Concentration   5. Cocoa processing      1. Harvesting /cleaning      2. Fermentation      3. Drying      4. Roasting      5. Winnowing      6. Nibs grinding      7. Alkalization      8. Liquor processing      9. Cocoa grinding      10. Cocoa butter /chocolate manufacturing | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Process carbonated soft drinks | * 1. Carbonated soft drinks      1. Colas      2. Energy drinks      3. Colas      4. Water Purification.      5. Beverage Mixing.      6. Filling.      7. Capping.      8. Labelling.      9. Packaging.      10. Returnable Glass Bottles (RGBs)      11. PET Bottles.   2. Energy drinks      1. sugar syrup section,      2. blending section,      3. carbonation section,      4. can filling section      5. packaging section | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Projector | LCD | 1 | 1:25 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72M2** |  |  |
|  | Laboratory | **72M2** | 1 | 1:25 |
|  | Functional Workshop | **72M2** | 1 | 1:25 |
| **C** | **Consumable materials** | | | |
| 1. . | First aid kit |  | 1 | 1:25 |
|  | Aprons |  | 25 | 1:1 |
|  | White coats |  | 25 | 1:1 |
|  | Hairnets |  | 25 | 1:1 |
|  | Cut resistant gloves |  | 25 | 1:1 |
|  | Corks and caps | enough for training | 100 | 4:1 |
|  | Trash and recycling bins |  | 5 | 1:5 |
| **D** | **Tools and Equipment** | | | |
|  | thermometers | Food-grade | 5 | 1:5 |
|  | Refractometers | Hand held | 5 | 1:5 |
|  | Bottling machine | Commercial | 1 | 1:25 |
|  | Carbonation machine | Commercial | 1 | 1:25 |
|  | Cupper machines | Commercial | 1 | 1:25 |
|  | Labels and labelling machine | Commercial | 1 | 1:25 |
|  | Bottle washer | Commercial | 1 | 1:25 |
|  | Refrigerators 2/ cold room |  | 2 | 1:12.5 |
|  | Ice maker 1 | Commercial | 1 | 1:25 |
|  | Soda maker 1 | Commercial | 1 | 1:25 |
|  | 1 Fermentation vessel | Commercial | 1 | 1:25 |
|  | Brew tanks 1 | Commercial | 1 | 1:25 |
|  | 1 Coffee Roaster | Commercial | 1 | 1:25 |
|  | 1 Titrator |  | 1 | 1:25 |
|  | 5 pH meters |  | 5 | 1:5 |
|  | 1 Blanching equipment | Commercial | 1 | 1:25 |
|  | 1 Water purifier |  | 1 | 1:25 |
|  | 1 Can seamer | Commercial | 1 | 1:25 |
|  | filtration system | Commercial | 1 | 1:25 |

## **MEAT PROCESSING**

**ISCED UNIT CODE: 0721 551 17A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Process Meat Products**

**Duration of Unit: 60 Hours**

**Unit Description:**

This unit specifies the competencies required to process meat products. It involves animal slaughter procedure, processing pork products and processing shoat products.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Animal slaughter procedure and meat inspection | 20 |
| 2. | Process pork products | 20 |
| 3. | Process shoat products | 20 |
| **Total** | | **60** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Animal slaughter procedure and meat inspection | * 1. Animal acquisition   2. Animal slaughter procedure      1. Pre-slaughter handling,      2. Stunning and bleeding techniques,      3. Evisceration,      4. Carcass processing   3. Postmortem changes   4. Meat quality      1. Meat colour      2. Juiciness of meat      3. Marbling fat content      4. Meat tenderness   5. Meat inspection | * Practical assessment * Portfolio of evidence * Project * Third party report * Written tests * Oral assessment |
| 1. Process pork products | * 1. Pork slaughter procedure   2. Pork products equipment   3. Pork products      1. Sausages      2. Meat loaf      3. Meat ham      4. Frankfurters      5. Meat burgers      6. Biltong meats   4. Sausage processing      1. Formulation      2. Preparation (Curing)      3. Analysis of finished product      4. Packaging   5. Meat loaf processing      1. Formulation      2. Preparation (Curing)      3. Baking      4. Analysis of finished product      5. Packaging   6. Meat ham processing      1. Formulation      2. Preparation (Curing)      3. Analysis of finished product      4. Packaging   7. Frankfurters processing      1. Formulation      2. Preparation (Curing)      3. Analysis of finished product      4. Packaging   8. Meat burgers processing      1. Formulation      2. Preparation      3. Analysis of finished product      4. Packaging   9. Biltong meats processing      1. Formulation      2. Preparation      3. Analysis of finished product   10. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party report * Written tests * Oral assessment |
| 1. Process shoat products | * 1. Shoat slaughter procedure   2. Shoat products equipment   3. Shoat products      1. Mutton      2. Chevon      3. Frankfurters      4. Dry fermented sausages   4. Dried meat Sausage      1. Formulation      2. Preparation      3. Analysis of finished product      4. Packaging   5. Chevon      1. Formulation      2. Processing      3. Analysis of finished product      4. Packaging   6. Frankfurters      1. Formulation      2. Preparation      3. Analysis of finished product      4. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party report * Written tests * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Projector | LCD | 1 | 1:25 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72 m2** | 1 | 1:25 |
|  | Food workshop | **72 m2** | 1 | 1:25 |
|  | Food microbiological laboratory | **72 m2** | 1 | 1:25 |
|  | Food chemistry laboratory |  | 1 | 1:25 |
|  | Cold room | **22 m2** | 1 | 1:25 |
|  |  |  |  |  |
| **C** | **Consumable materials** | | | |
|  | Artificial casings |  | 5 | 1:5 |
|  | Curing salts | (enough) | Various |  |
|  | Microbiological Test Kits |  | 5 | 1:5 |
|  | Meat |  | 10kg | 10:25 |
| **D** | **Tools and Equipment** | | | |
|  | Water bath |  | 5 | 1:5 |
|  | Food-grade thermometers |  | 5 | 1:5 |
|  | aprons/ white lab coats |  | 25 | 1:25 |
|  | First aid kit |  | 1 | 1:25 |
|  | Mincer /meat grinder |  | 5 | 1:5 |
|  | Sausage filler |  | 1 | 1:25 |
|  | Bowl chopper |  | 2 | 1:13 |
|  | Vacuum packaging equipment |  | 1 | 1:25 |
|  | Smoking chamber |  | 1 | 1:25 |
|  | 4 Baking oven |  | 5 | 1:5 |
|  | Freezers |  | 5 | 1:5 |
|  | 1 UV sterilisers |  | 1 | 1:25 |
|  | 5 meat hooks | Stainless steel | 5 | 1:5 |
|  | Dehydrator | Commercial | 1 | 1:25 |
|  | Bone Saw |  | 1 | 1:25 |
|  | Handwashing Stations |  | 2 | 1:12.5 |
|  | Sanitizing Station | Automatic | 2 | 1:12.5 |
|  | Honing Steel and Sharpeners |  | 10 | 1:12.5 |
|  | Boning Hooks | For handling larger cuts of meat. | 5 | 1:5 |
|  | Meat Mallets |  | 5 | 1:5 |
|  | Water Activity Meter |  | 5 | 1:5 |
|  | Carts and Trolleys |  | 1 | 1:25 |
|  | Storage Racks |  | 5 | 1:5 |
|  | Fire extinguishers |  | 5 | 1:5 |
|  | Baking tins | Stainless steel | 10 | 1:12.5 |
|  | Captive bolt stunning gun |  | 1 | 1:12 |
|  | Butcher Knives | (Various Types) | 10 | 1:12.5 |
|  | Cutting Boards |  | 10 | 1:12.5 |

## **CEREALS PRODUCTS PROCESSING**

**ISCED UNIT CODE: 0721 551 18A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Process Cereal Products**

**Duration of Unit: 100 Hours**

**Unit Description:**

This unit specifies the competencies required to processcereal products. It involves milling cereals, pasta products and cereal snacks.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Mill cereals | **35** |
| 2. | Process pasta products | **35** |
| 3. | Process cereal snacks | **30** |
| **Total** | | **100** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Mill cereals | * 1. Types of cereals      1. Maize      2. Wheat      3. Oats      4. Barley      5. Rice   2. Raw material quality control tests   3. Milling equipment   4. Cereal processing      1. Weighing      2. Cleaning      3. Tempering /conditioning      4. Milling      5. Screening and byproducts      6. Flour analysis      7. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party report * Written tests * Oral assessment |
| 1. Process pasta products   (No content on process baked products) | 1. Pasta products:    1. Noodles,    2. Spaghetti,    3. Macaroni 2. Pasta equipment 3. Formulation 4. Mixing and kneading 5. Sheeting and rolling 6. Size reduction and shaping 7. Drying 8. Final product analysis 9. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party report * Written tests * Oral assessment |
| 1. Process cereal snacks | 1. Cereal snacks:    * 1. Corn flakes,      2. granola,      3. puffed cereals 2. Cereal snacks equipment 3. Formulation 4. Mixing 5. Shaping and forming 6. Extrusion and frying 7. Final product analysis 8. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party report * Written tests * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio (item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Personal protective equipment | * Lab Coats * Safety Goggles * Gloves * Ear muffs * Gumboots | 25 each | 1:1 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 2 | 1:25 |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
| 1. **Consumable materials** | | | | |
|  | Packaging equipment | Polyethylene bags  Grease proof paper | 10 each | 1:3 |
| 1. **Tools and equipment** | | | | |
|  | Mixers | Vertical (planetary mixers) | 5 | 1:5 |
|  | Proofers | Vertical commercial proofers | 5 | 1:5 |
|  | Ovens | Commercial ovens | 5 | 1:5 |
|  | Baking tins | Aluminum or stainless-steel baking tins | 25 | 1:1 |
|  | Sheeting material | Commercial | 1 | 1:25 |
|  | Moulding equipment | Commercial | 1 | 1:25 |
|  | Puffing equipment | Commercial | 1 | 1:25 |
|  | Drum drier | Commercial | 1 | 1:25 |
|  | Manual mixing equipment | Whiskers | 25 | 1:1 |
|  | Cooling equipment | Cooling racks | 5 | 1:5 |
|  | Slicing equipment | Bread slicer | 5 | 1:5 |

## **FATS AND OILS PROCESSING**

**ISCED UNIT CODE: 0721 551 19A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Process Fats and Oils**

**Duration of Unit: 200 Hours**

**Unit Description:**

This unit specifies the competencies required to process fats and oils. It involves extracting, refining, modifying and processing edible lipids.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Extract edible lipids | 50 |
| 2. | Refine edible lipids | 50 |
| 3. | Modify edible lipids | 50 |
| 4. | Process edible lipids | 50 |
| **Total** | | **200** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Extract edible lipids | * 1. Sources of fats and oils      1. Plants      2. Animal   2. Physical properties of fats and oils      1. smoke point      2. Fire point      3. Flush point      4. Melting point      5. Density and refractive index      6. Polymorphism      7. Colour and taste   3. chemical properties of fats and oils      1. Saponification value      2. Iodine value      3. Peroxide value      4. Acid value      5. Hydrogenation   4. Functional properties of fats and oils   5. Preparation of material for extraction   6. Oil extraction equipment   7. Fat rendering equipment   8. Lipid sources:   9. plants,   10. Extraction techniques:   11. Solvent techniques   12. Pressing equipment   13. Pre-pressing and solvent extraction   14. Rendering techniques:       1. wet and       2. dry rendering       3. Vacuum rendering | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Refine edible lipids | 1. Degumming    * 1. Acid degumming      2. Hydro degumming      3. Enzyme degumming 2. Alkaline refining 3. Bleaching    * 1. Chemical      2. Physical 4. Deodorisation | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Modify edible lipids | 1. Fats and oils modification    * 1. Hydrogenation      2. Winterisation and fractionation      3. Interesterification      4. Plasticizing actions | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Process edible lipids products | * 1. Lipid based products:      1. mayonnaise,      2. salad dressing,      3. margarine,   2. Rendered products   3. Formulation   4. Lipid based product processing:      1. Mayonnaise processing      2. Salad dressing      3. Margarine processing      4. Lard processing      5. Tallow processing      6. Final product analysis   5. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Manuals | Recipes | 5 | 1:5 |
|  | Training videos | Demonstration | 5 | 1:5 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72 m2** | 1 | 1:25 |
|  | Laboratory | **72 M2** | 1 | 1:25 |
|  | Workshop | **72m2** | 1 | 1:25 |
| **C** | **Consumable materials** | | | |
|  | Cooking oil |  | 1 kg | 1:25 |
|  | Cooking fat |  | 1kg | 1:25 |
|  | Reagents |  | Assorted | Enough for 25 trainees |
|  | Volumetric flasks: |  | 100 | 4:1 |
|  | Pipettes: | (including micro, macro, and serological) | 100 | 4:1 |
|  | Burettes |  | 25 | 1:1 |
|  | Graduated cylinders |  | 100 | 4:1 |
|  | Beakers | Different sizes | 200 | 8:1 |
|  | Erlenmeyer flasks | Different sizes | 150 | 6:1 |
|  | Test tubes |  | 200 | 8:1 |
|  | Watch glasses |  | 50 | 2:1 |
|  | Funnels |  | 50 | 2:1 |
| **D** | **Tools and Equipment** | | | |
|  | Dehuller | Commercial | 1 | 1:25 |
|  | Screw press | Commercial | 1 | 1:25 |
|  | Extraction vats | Commercial | 2 | 1:12.5 |
|  | Solvent extractor |  | 2 | 1:12.5 |
|  | Bleaching tank | Commercial | 1 | 1:25 |
|  | Filling machine | Commercial | 1 | 1:25 |
|  | Roller mill | Commercial | 1 | 1:25 |
|  | Crusher | Commercial | 1 | 1:25 |
|  | Centrifuge | Commercial | 1 | 1:25 |
|  | Margarine blender | Commercial | 1 | 1:25 |

## **SUGAR PROCESSING**

**ISCED UNIT CODE: 0721 551 20A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Process Sugar**

**Duration of Unit: 100 Hours**

**Unit Description:**

This unit specifies the competencies required to process sugar. It involves processing sugar from sugarcane and honey.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Process sugar from sugarcane | 50 |
| 2. | Perform sugar refining | 20 |
| 3. | Process honey | 30 |
| **Total** | | **100** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Process sugar from sugarcane | * 1. Sugar processing      1. Raw material analysis      2. Milling      3. Juice treatment and clarification      4. Crystallisation      5. Drying      6. Final product analysis      7. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Perform sugar refining | * 1. Affination   2. Clarification   3. Decolourization   4. Crystallization   5. Crystal drying | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Process honey | 1. Honey processing 2. Raw honey quality assessment 3. Warming 4. Concentrating 5. Cooling 6. Skimming 7. Final product analysis 8. Packaging | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/no.** | **Category/item** | **Description/specification** | **Quantity** | **Recommended ratio (item: trainee)** |
| 1. **Learning materials** | | | | |
|  | Personal protective equipment | * Lab Coats * Safety Goggles * Gloves * Ear muffs * Gumboots | 25 each | 1:1 |
| 1. **Learning facilities and infrastructure** | | | | |
|  | Lecture/theory room | 72m2 | 1 | 1:25 |
|  | Whiteboard | 4 feet by 8 feet | 1 | 1:25 |
|  | Projector | LCD High resolution | 1 | 1:25 |
|  | Computers | RAM: 8GB | 25 | 1:25 |
|  | Printers | Ink Jet | 2 | 1:13 |
|  | Functional pilot food plant | 72m2 | 1 | 1:25 |
|  | Food microbiological laboratory | 72m2 | 1 | 1:25 |
|  | Food chemistry laboratory | 72m2 | 1 | 1:25 |
|  | Cabinets | Storage cabinets | 4 | 1:7 |
|  | Waste Containers | For solid and liquid wastes | 5 | 1:5 |
| 1. **Consumable materials** | | | | |
|  | Packaging equipment | * Glass/plastic jars |  | 1:8 |
| 1. **Tools and equipment** | | | | |
|  | Food grade thermometer | thermometer | 25 | 1:1 |
|  | Heating vessels | Stainless steel heating vessels | 25 | 1:1 |
|  | Mixers | Electric mixer | 5 | 1:5 |
| Manual mixer (whisking equipment) | 25 | 1:1 |
|  | Cutting equipment | Spatula, cutters | 25 | 1:1 |
|  | Evaporator | Batch open type evaporator | 1 | 1:25 |

## **RESEARCH PROJECT**

**ISCED UNIT CODE:** 0111 551 21A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Conduct research project**

**Duration of Unit:** 100 Hours

**Unit Description**

This unit covers the competencies required to conduct research project. It involves identifying research problem, preparing research proposal and performing data collection

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Identify Research Problem | 20 |
| 2. | Prepare research proposal | 40 |
| 3. | Perform Data Collection | 40 |
| **Total** | |  |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| Identifying research problems | * 1. Introduction to research methodology      1. Research process (cycle)   2. Types of literature review   3. Formulation of a research problem statement | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| Preparing research proposal | * 1. Components of a research proposal      1. Research topic      2. Abstract      3. Objectives      4. Hypothesis      5. Problem statement      6. Justification      7. Literature review      8. Methodology      9. Conclusion | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| Performing data collection | * 1. Sources of data   2. Data collection methods and instrument   3. Statistical data analysis   4. Scientific communication      1. Oral presentation      2. Report writing | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Flip charts |  | 10 | 1:2.5 |
|  | Manuals |  | 25 | 1:25 |
|  | Recipe cards |  | 25 | 1:1 |
|  | Training videos |  | 5 | 1:5 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72M2** |  |  |
|  | Workshop | **72 M2** | 1 | 1:25 |
| **C** | **Consumable materials** | | | |
|  | Printer cartridge | Full set with different colours | 5 | 1:5 |
|  | Stationery | Printing papers. foolscaps, pens., ink | 25 | 1:1 |
|  | Internet connection | 240 mbps | 1 | 1:25 |
| **D** | **Tools and Equipment** | | | |
|  | Computer | With   * + Windows/Linux/Macintosh Operating System   + Microsoft Office Software   + Google Workspace Account   + Antivirus Software | 5 pcs | 1:5 |
|  | Projector | LCD | 1 | 1:25 |
|  | Printer | Colour printer | 2 | 1:12.5 |

**FOOD PROCESSING QUALITY ASSURANCE**

**ISCED UNIT CODE:** 0721 551 22A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Perform food processing quality assurance**

**Duration of Unit:** 120 Hours

**Unit Description**

This unit covers the competencies required to perform food processing quality assurance. It involves implementing food safety and quality systems, performing quality inspections and audits, analyzing raw materials and food products as well as using resources sustainably.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Implement food safety and quality systems | 40 |
| 2. | Perform quality inspections and audits | 30 |
| 3. | Analyse raw material and product | 40 |
| 4. | Use resources sustainably | 10 |
| **Total** | | **120** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Implement food safety and quality systems | * 1. Food safety and quality systems      1. ISO 9000      2. ISO 22000         1. Hazard analysis and critical control points (HACCP)      3. Hazard ARPC   2. Pre-requisite programs:      1. Good Manufacturing Practices (GMPs)      2. Good Hygienic Practices (GHPs)   3. regulatory requirements      1. International standards e.g. ISO 22000:2015, ISO 9000: 2015 QMS, HALAL      2. National standards e.g., KEBS      3. Workplace standards      4. Rainforest Alliance      5. NEMA Regulations 2006      6. OSH Act, 2007      7. KEBS standards and specifications      8. Business permits      9. County Public Health Act (CAP. 242)   4.5 Maintaining food quality and safety systems  4.6 Food safety and quality records | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Perform quality inspections and audits | * 1. Food quality inspections:      1. Raw materials      2. In process      3. Final products      4. Packaging materials      5. Food storage      6. Hand washing facilities   2. Production process audits | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Analyse raw material and product | * 1. Sampling procedures      1. Simple Random      2. Stratified      3. Systematic sampling      4. Cluster      5. Composite   2. Sample and reagent preparation   3. Equipment calibration   4. Food analysis procedures      1. Microbiological      2. Physical tests      3. Chemical tests      4. Organoleptic | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Use resources sustainably | * 1. Environmental legislation in Kenya      1. Article 69(2) of the Constitution of Kenya      2. EMCA 1999   2. Food production resources      1. Water      2. Energy   3. Resource wastage minimisation methods:      1. Resources reuse      2. Resources recycle      3. Quality control improvement      4. Process monitoring      5. Optimization of resources   4. Environmental conservation measures | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

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**Suggested Methods of Delivery**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Power point presentations | For trainer’s use | 1 | 1:25 |
|  | Flip charts |  | 1 | 1:25 |
|  | Manuals |  | 25 | 1:25 |
|  | Recipe cards |  | 25 | 1:1 |
|  | Training videos |  | 5 | 1:5 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Lecture/theory room | **72M2** | 1 |  |
|  | Workshop | **72 M2** | 1 | 1:25 |
|  | Laboratory | **72 M2** | 1 |  |
| **C** | **Consumable materials** | | | |
|  | Cleaning materials |  |  |  |
|  | Personal protective equipment | Lab Coats Safety Goggles: Gloves Ear muffs | 25 sets | 1:25 |
|  | Pipettes | Micropipettes (1-10 μL, 10-100 μL, 100-1000 μL): 10 sets (each set contains 3 different sizes for group use) | 1set each | 1:1 |
|  | Graduated Pipettes (1 mL, 5 mL, 10 mL): 20 (shared between groups) | 1 set each | 1:1 |
|  | Pipette Tips: 500-1000 tips (various sizes, shared) | 1 set each | 1:1 |
|  | Beakers 50 (shared between pairs/groups) | (100 mL, 250 mL, 500 mL): | 100 | 4:1 |
|  | Flasks (Erlenmeyer or volumetric) | 100 mL, 250 mL, 500 mL: 25 each size (one per trainee, per experiment) | 100 each | 4:1 |
|  | Graduated Cylinders | (10 mL, 50 mL, 100 mL): | 75 (3 each) | 1:1 |
|  | Test Tubes | (16 mm x 150 mm): | 200 | to ensure enough for multiple experiments |
|  | Test Tube Racks |  | 25 | 1:1 |
|  | Measuring Scoops/Spatulas |  | 25 | 1:1 |
|  | Glass Stirring Rods |  | 25 | 1:1 |
|  | Funnels | 100 mm | 25 | 1:1 |
|  | Watch Glasses |  | |  |  | | --- | --- | | 25 | 1:1 | | 1:1 |
|  | Droppers |  | 25 | 1:1 |
|  | Burettes | 50 ml | 25 | 1:1 |
|  | Burette Stand | Complete | 25 | 1:1 |
|  | Petri Dishes | 200 mm dia | 50 | 2:1 |
|  | Filter Paper | 125 mm | 100 | 4:1 |
|  | Centrifuge | Hettich rotofix 32 A | 1 | 1:25 |
|  | Centrifuge Tubes |  | 50 | 2:1 |
|  | Separatory Funnels | (250 mL, 500 mL): (shared for liquid-liquid extractions) | 25 | 1:1 |
|  | Wash Bottles |  | 25 | 1:1 |
|  | Cleaning Brushes |  | 10 |  |
|  | Stirring Hot Plates | with Magnetic Stirrers | 10 | 1:2.5 |
|  | Magnifying Glasses |  | 10 | 1:2.5 |
|  | Forceps/Tweezers |  | |  |  | | --- | --- | | 25 | 1:1 | | 1:1 |
|  | Glass Markers/Labels | (one per trainee for labeling samples) | 25 | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Soxhlet apparatus |  | 5 | 1:5 |
|  | Heating Mantles: | for heating liquids in flasks, shared | 5 | 1:5 |
|  | Hot Plates: | (shared between groups) | 10 | 1:2.5 |
|  | pH meters |  | 5 | 1:5 |
|  | UV-Vis spectrophotometer |  | 1 | 1:25 |
|  | Lovibond comparator |  | 5 | 1:5 |
|  | refractometers | (hand-held) | 5 | 1:5 |
|  | Kjedahl apparatus |  | 1 | 1:25 |
|  | Air Oven |  | 5 | 1:5 |
|  | vacuum oven |  | 5 | 1:5 |
|  | water baths |  | 10 | 10:25 |
|  | Fume chambers |  | 2 |  |
|  | Rapid moisture analyzers |  | 5 | 1:5 |
|  | Muffle furnace |  | 1 | 1:25 |
|  | Weighing balance |  | 5 | 1:5 |
|  | Lamina hood |  | 1 | 1:25 |
|  | Autoclave |  | 1 | 1:25 |
|  | Colony counter |  | 1 | 1:25 |
|  | Anaerobic jar |  | 1 | 1:25 |
|  | incubator |  | 1:25 | 1:25 |
|  | Sterile blender jars |  | 5 | 1:5 |
|  | Microscopes |  | 5 | 1:5 |
|  | Storage Cabinets |  | 5 | 1:5 |
|  | Fridge |  | 1 | 1:25 |
|  | Freezer |  | 1 | 1:25 |
|  | First aid kit |  | 1 | 1:25 |
|  | Stopwatches |  | 25 | 1:1 |
|  | Training kits for OSHA |  | 5 | 1:5 |
|  | Visual Boards |  | 5 | 1:5 |
|  | Lab benches/Workstations: (one per trainee) |  | 25 | 1:1 |
|  | Desiccators: | (shared for drying materials) | 5 | 1:5 |
|  | Tongs |  | 25 | 1:1 |
|  | Waste Containers (for solid and liquid waste) | (for hazardous and non-hazardous waste, shared) | 5 | 1:5 |
|  | Sharps Disposal Containers: | 3 (for safe disposal of glass, needles, etc.) | 3 | 1:25 |
|  | Computers/Tablets | (shared for data recording and analysis) | 5 | 1:5 |
|  | Printers | (for printing experiment data and reports) | 1 | 1:5 |

**NEW FOOD PRODUCTS DEVELOPMENT**

**ISCED UNIT CODE:** 0721 551 23A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Develop new food products**

**Duration of Unit:** 160 Hours

**Unit Description**

This unit specifies the competencies required to develop new food product. It involves generating new food product ideas, conducting new product feasibility studies, producing new food product prototype, analyzing new food product prototype, conducting new food product tests, introducing new food product and conducting competitor product analysis.

**Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Generate new food product ideas | **10** |
| 2. | Conduct new product feasibility studies | 20 |
| 3. | Produce new food product Prototype | 40 |
| 4. | Analyse product prototype | 30 |
| 5. | Conduct new food product test | 20 |
| 6. | Introduce new product | 20 |
| 7. | Conduct competitor product analysis | 20 |
| **Total** | | **160** |

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Generate new food product ideas | * 1. Idea sources      1. Consumer complaints      2. Marketing intelligence   2. Idea generation (ideation)   3. Idea screening   4. Concept development | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Conduct new product feasibility studies | * 1. Research methodology   2. Development of new product feasibility study strategy   3. Identification of new product development resources   4. Budgeting and resource mobilization   5. Conducting new product feasibility studies   6. Preparation and presentation of feasibility study report | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Produce new food product Prototype | * 1. Development of product prototype quality characteristics   2. Product prototype formulation methods   3. Designing new product prototype processing procedure   4. Acquisition of resources for prototype development   5. Product prototype development   6. Documentation of development | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Analyse product prototype | * 1. Sampling of the new product prototype   2. Analysis of the new product prototype:   3. Sensory evaluation   4. Laboratory analysis   5. Reworking (reformulation) of the prototype | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Conduct new food product test | * 1. Sampling of the new product   2. New product prototype laboratory tests      1. Raw material tests      2. In-process tests      3. End-products tests      4. Shelf-life      5. Trade sample tests      6. Non-conformance   3. New product legal and statutory requirements (Standards)   4. Product packaging requirements   5. Documentation of the new product | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Introduce new product | * 1. Registration and patenting of new product      1. New product commercialization      2. Development of new product commercialization strategy      3. Development of new product quality monitoring framework   2. Parameters to be tested      1. Tests to be done      2. Testing frequency      3. Sampling method | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |
| 1. Conduct competitor analysis | * 1. Competing products analysis   2. Consumer feedback analysis      1. Product performance      2. Report preparation      3. Documentation of product performance and follow ups | * Practical assessment * Portfolio of evidence * Project * Third party reports * Written test * Oral assessment |

**Suggested Methods of Delivery-**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | | **Quantity** | | **Recommended Ratio**  (Item: Trainee) | |
| **A** | **Learning Materials** | | | | | | |
|  | Power point presentations | | For trainer’s use | | 1 | | 1:25 | |
|  | Flip charts | |  | | 1 | | 1:1 | |
|  | Manuals | |  | | 25 | | 1:1 | |
|  | Training videos | |  | | 25 | | 1:1 | |
|  | Recipe cards | |  | | 25 | | 1:1 | |
| **B** | **Learning Facilities & infrastructure** | | | | | | |
|  | Lecture/theory room | 72 m2 | |  | |  | |
|  | Cold Room | 25 m2 | |  | |  | |
|  | Functional Workshop | 72m2 | |  | |  | |
|  | Laboratory | 72 m2 (With fume chamber) | |  | |  | |
| **C** | **Consumable materials** | | | | | | |
|  | Volumetric flasks | Assorted | | 200 | |  | |
|  | Pipettes: 150 | (including micro, macro, and serological) | | 200 | |  | |
|  | Burettes | 50 ml | | 55 | |  | |
|  | Graduated cylinders | Assorted | | 100 | |  | |
|  | Beakers | Assorted | | 200 | |  | |
|  | Erlenmeyer flasks | Assorted | | 200 | |  | |
|  | Test tubes | ø 15.30 x 150 x 0.80 mm. | | 200 | |  | |
|  | Watch glasses |  | | 50 | |  | |
|  | Funnels |  | | 50 | |  | |
| **D** | **Tools and Equipment** | | | | | | |
|  | Assorted Knives |  | | 25 | |  | |
|  | assorted Utensils |  | | 25 | |  | |
|  | Analytical balances |  | | 5 | |  | |
|  | Homogenizer |  | | 1 | |  | |
|  | Weighing scale |  | | 4 | |  | |
|  | Microscope |  | | 10 | |  | |
|  | Colony counter |  | | 2 | |  | |
|  | Blenders |  | | 5 | |  | |
|  | Autoclave |  | | 2 | |  | |
|  | Refractometers |  | | 5 | |  | |
|  | Heating mantle |  | | 5 | |  | |
|  | Moisture analyzer |  | | 1 | |  | |
|  | Titration equipment |  | | 1 | |  | |
|  | HPLC |  | | 1 | |  | |
|  | Centrifuge |  | | 1 | |  | |
|  | Evaporator |  | | 1 | |  | |
|  | UV Spectrophotometer |  | | 1 | |  | |
|  | GLC |  | | 1 | |  | |
|  | PH Meter |  | | 5 | | 1:5 | |
|  | Clarifier |  | | 1 | |  | |
|  | Thermometers |  | | 15 | | 2:3 | |
|  | Pasteurizer |  | | 1 | | 1:25 | |
|  | Mixer |  | | 3 | | 3:25 | |
|  | Sealers |  | | 2 | | 2:25 | |
|  | Fryers |  | | 2 | | 2:25 | |
|  | Baking ovens |  | | 3 | | 3:25 | |
|  | Butter churn |  | | 1 | | 1:25 | |
|  | Mincer |  | | 1 | | 1:25 | |