

**REPUBLIC OF KENYA**

**COMPETENCY BASED MODULAR CURRICULUM**

**FOR**

**ARCHITECTURE**

**KNQF LEVEL: 6**

**ISCED PROGRAMME CODE: 0732 554 A**

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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 construction Sector’s growth and development.

**PRINCIPAL SECRETARY**

**STATE DEPARTMENT FOR TVET**

**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.

**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 construction national construction sector Skills Committee (NSSC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the construction 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 construction Sector acquire competencies to perform their work more efficiently and effectively.

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# ABBREVIATIONS AND ACRONYMS

CBETA - Competency-Based Education, Training, and Assessment

CPU - Central Processing Unit

CAD - Computer Aided Design

GNSS - Global Navigation Satellite System

ICT - Information Communication Technology

IP - Iron Pin

IPC - Iron Pin in Concrete

IPCU - Iron Pin in Concrete Underground

ISCED - International Standard Classification of Education

KCPE - Kenya Certificate of Primary Education

KCSE - Kenya Certificate of Secondary Education

KNQA - Kenya National Qualifications Authority

OSHA - Occupation Safety and Health Act

OSHS - Occupation Safety and Health Standards

PPE - Personal Protective Equipment

TVET - Technical and Vocational Education and Training

TVETA - Technical and Vocational Education and Training Authority.

# KEY TO UNIT CODE

**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

# COURSE OVERVIEW

The Architectural Technician Level 6 consists of competencies that a trainee must achieve to enable them to work in the Construction Sector. It entails performing designing architectural model, producing digital architectural model, producing physical architectural model, applying computer-aided design and drawing techniques, carrying out architectural landscaping, designing architectural interiors and managing construction project

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |  |  |
| --- | --- | --- | --- |
| **MODULE 1** | | | |
| **UNIT CODE** | **UNIT TITLE** | **UNIT DURATION (HOURS)** | **CREDIT FACTOR** |
| 0731 551 01A | PHYSICAL ARCHITECTURAL MODEL PRODUCTION | 120 | 12 |
| 0731 551 02A | ART AND ARCHITECTURAL LANGUAGE | 180 | 18 |
| 0731 551 03A | TECHNICAL DRAWING TECHNIQUES | 140 | 14 |
| 0031 541 04A | COMMUNICATION SKILLS | 40 | 4 |
| **SUBTOTAL** | | **480** | **48** |
| **MODULE 2** | | | |
| **UNIT CODE** | **UNITS TITLE** | **UNIT DURATION (HOURS)** | **CREDIT FACTOR** |
| 0731 551 05A | DIGITAL ARCHITECTURAL MODEL | 120 | 18 |
| 0731 551 06A | COMPUTER-AIDED DESIGN DRAWING TECHNIQUES | 130 | 18 |
| 0731 551 07A | MATHEMATICS FOR ARCHITECTS i | 120 | 12 |
| 0611 551 08A | DIGITAL LITERACY | 50 | 18 |
| **SUBTOTAL** | | 420 | 42 |
| MODULE 3 | | | |
| 0731 551 09A | MATHEMATICS FOR ARCHITECTS II | 94 | 9.4 |
| 0731 551 10A | ARCHITECTURAL LANDSCAPING | 120 | 12 |
| 0731 551 11A | HISTORY OF ARCHITECTURE | 90 | 9 |
| 0731 551 12A | ENGINEERING SURVEY PRINCIPLES | 150 | 15 |
| SUBTOTAL | | 454 | 45.4 |
| MODULE 4 | | | |
| 0731 551 13A | ARCHITECTURAL INTERIORS DESIGN | 180 | 18 |
| 0731 551 14A | STRUCTURAL ANALYSIS PRINCIPLES | 180 | 18 |
| 0731 551 15A | CONSTRUCTION MATERIALS PRINCIPLES | 120 | 12 |
| Sub Total | | 480 | 48 |
| MODULE 5 | | | |
| **UNIT CODE** | **UNITS TITLE** | **UNIT DURATION (HOURS)** | **CREDIT FACTOR** |
| 0731 551 16A | CONSTRUCTION PROJECT MANAGEMENT | 150 | 15 |
| 0731 551 17A | BUILDING CONSTRUCTION TECHNOLOGY PRINCIPLES | 210 | 21 |
| Sub Total | | 360 | 36 |
| **MODULE 6** | | | |
| 0413 541 18A | ENTREPRENEURIAL SKILLS | 40 | 5 |
| 0731 551 19A | BUILDING WORKS MEASUREMENTS PRINCIPLES | 180 | 18 |
| 0731 551 20A | ARCHITECTURAL PROJECT DESIGN | 250 | 25 |
| **SUB TOTAL** | | **470** | **47** |
| Industrial Attachment | | 480 | **48** |
| **GRAND TOTAL** | | **3144** | **314.2** |

The total duration of the course is **3360** hours.

**Entry Requirements**

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

a)      Kenya Certificate of Secondary Education (KCSE) mean grade C – (MINUS),

b)    Any other equivalent qualification as determined by the Technical and Vocational and Training Authority (TVETA).

**Industry Training**

An individual enrolled in this course will be required to undergo a field attachment for a minimum period of 480 hours in a construction sector.

**Trainer qualification**

Qualification of a trainer for this course include:

1. have a minimum of a bachelor degree in Architecture or its equivalent in the area of specialization.
2. be registered by TVETA.

**Industry Training**

An individual enrolled in this course will be required to undergo Industry training for a minimum period of 480 hours in construction 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

**Assessment**

The course shall be assessed formatively and summatively:

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 weight shall be 40:60 level 6 for each unit of learning.
5. 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.

1. 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 Architecture 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

## 

# MODULE 1

## PRODUCE PHYSICAL ARCHITECTURAL MODEL

**UNIT CODE: 0731 551 01A**

**Relationship to Occupational Standards**

This unit addresses the unit of competenc**y: Produce Physical Architectural Model**

**Duration of Unit: 120 hours**

**Unit Description**

This unit covers the competencies required by an Architectural technician to produce a physical architectural model. It includes, Producing conceptual model, Producing Presentation model and Producing site model.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOMES | DURATION(HRS) |
|  | Produce a conceptual model | 40 |
|  | Produce Presentation model | 40 |
|  | Produce site model | 40 |
| **TOTAL** | | **120** |

#### 

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Produce a conceptual model | * 1. Conceptual modelling tools, equipment and materials      1. Razor      2. Scalpel      3. Scissors      4. Scale Rule      5. Manilla paper      6. Adhesive      7. NT cutter      8. Steel rule   2. Conceptual modelling materials cutting.      1. Walling      2. Columns      3. Staircase      4. Roofing      5. Grills      6. claddings   3. Conceptual model assembly.      1. Model assembly parameters         1. Accuracy         2. Scale         3. Neatness | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| Produce  Presentation model | * 1. Presentation modelling tools, equipment and materials.      1. razors Capel      2. Scissors      3. Scale Rule      4. Manilla paper      5. Adhesive      6. NT cutter      7. Steel rule   2. Presentation modelling materials cutting.      1. Walling      2. Columns      3. Staircase      4. Roofing      5. Grills      6. claddings   3. Presentation model generation.      1. Model assembly parameters         1. Accuracy         2. Scale         3. Neatness | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| Produce site model | * 1. Site modeling tools, equipment and materials      1. razors Capel      2. Scissors      3. Scale Rule      4. Manilla paper      5. Adhesive      6. NT cutter      7. Steel rule   2. Contextual site map acquiring.   3. Site modeling materials cutting.      1. Street lighting      2. Retaining walls      3. Fences      4. Hedges      5. Kerbs      6. Pavements      7. Parking areas      8. Boundary walls   4. Site model generation.      1. Model assembly parameters         1. Accuracy         2. Scale         3. Neatness | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Architectural modelling reference books | For trainee’s use | 5 No. | 1:5 |
|  | NT cuter | For trainer’s use | 25 pcs | 1:1 |
|  | Scaled Trees | For trainee’s use | 250 pcs | 10:1 |
|  | Human scale figures | For trainee’s use | 250 pcs | 1:1 |
|  | Scaled vehicle models | For trainee’s use | 250 pcs | 10.1 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instruction room | 9m by 8m | 1 No | 1:25 |
|  | Studio room | 9m x 8m | 1 No | 1:25 |
| **C** | **Consumable materials** | | | |
|  | 5 reams of A2 drawing paper | For trainee’s use | 5 reams | 1:1 |
|  | 25 packets of colored pencil | For trainee’s use | 25 pkts | 1:1 |
|  | 25 packets of watercolors | For trainee’s use | 25 pkts | 1:1 |
|  | 25 packets of B pencil series | For trainee’s use | 25 pkts | 1:1 |
|  | 10 reams of watercolor papers | For trainee’s use | 10 reams | 1:13 |
|  | 2 reams of transparencies | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of embossed papers | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of mounting boards | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of forex boards | For trainee’s use | 2 reams | 1:13 |
|  | Adhesives | For trainee’s use | 25 pcs | 1:1 |
|  | Rolls Flip Charts | For both trainer’s and trainee’s use | 5 pcs | 1:5 |
|  | 100 m grass mart roll | For trainee’s use | 100 m | 4:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |
|  | Printer | For trainee’s use | 1 pcs | 1:25 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | Camera | For trainee’s use | 2 pcs | 1:13 |
|  | Laser distance measure | For trainee’s use | 25 pcs | 1:1 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |

## ART AND ARCHITECTURAL LANGUAGE PRINCIPLES

**UNIT CODE: 0731 551 02A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency:Apply Art and Architectural Language Principles

Duration of Unit: **180 hours**

**Unit Description**

This unit covers the principles required by an architectural technician in applying art and architectural language. These principles include applying architectural design fundamentals principles, producing architectural thematic expressions, applying anthropometric and ergonomics concepts, applying freehand drawing techniques and applying architectural drawings techniques

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Apply architectural design fundamentals principles | 30 |
|  | Produce architectural thematic expressions | 40 |
|  | Apply anthropometric and ergonomics concepts | 40 |
|  | Apply freehand drawing techniques | 30 |
|  | Apply architectural drawings techniques | 40 |
| **TOTAL** | | **180** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply architectural design fundamentals principles | * 1. Architectural design fundamental principles identification.      1. Functional principles      2. Aesthetic principles      3. Balance      4. Ratio and proportion      5. Form      6. Line      7. Shape      8. Texture      9. Value      10. Volume      11. Space   2. Architectural design principles application.      1. Functional principles      2. Aesthetic principles      3. Balance      4. Ratio and proportion      5. Contrast      6. Emphasis   3. Artistic forms production.      1. Concept development      2. Material selection      3. Techniques and skills      4. Production process      5. Collaboration and critique      6. Painting      7. Sculpture | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Produce architectural thematic expressions | * 1. Architectural thematic expression tools and equipmentS      1. Brushes      2. Computer      3. Pencils      4. Drawing and drafting tools      5. NT cutter      6. Drawing board      7. T square      8. Set squares      9. Templates   2. Architectural thematic expression materials      1. Water colour papers      2. Coloured pencils crayons      3. Drawing papers      4. Water colour papers      5. A-series papers      6. Embossed papers      7. Water colour paints      8. Oil colour paints      9. Coloured pencils      10. B-series pencils   3. Architectural thematic expression production.      1. Themes         1. Balance         2. Mystery         3. Scenery         4. Serenity         5. Proportion         6. Movement | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply anthropometric and ergonomics concepts | * 1. Architectural anthropometric and ergonomics tools and equipment      1. Tape measure      2. Leaser measure tool   2. Architectural anthropometric and ergonomics materials      1. Pencils      2. Sketch pad      3. Marker pens   3. Architectural anthropometric and ergonomics application.      1. Furniture sizes      2. Human shape and sizes      3. Doors and windows      4. Body measurements      5. Population density      6. Clearance and reaches      7. Workstation design      8. Human computer interaction      9. Circulation spaces | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply freehand drawing techniques | * 1. Architectural freehand drawing tools and equipment.      1. Pencils      2. Marker pens      3. Rulers      4. Drawing boards   2. Architectural freehand drawing materials.      1. Erasers      2. Drawing paper      3. Ink      4. Makers      5. Water colours   3. Architectural freehand drawings preparation.      1. Techniques         1. Line weight         2. Hatching         3. Perspective         4. Composition         5. Sketching         6. rendering | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply architectural   drawings techniques | * 1. Technical drawing tools and equipment.      1. Drawing board      2. Set square      3. Compasses      4. T square      5. French curve   2. Technical drawing materials.      1. Pencils      2. Drawing papers      3. Erasers      4. Masking tape   3. Technical drawing techniques performance.      1. Plane geometry      2. Solid geometry | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Art & Architectural Languages reference books | For trainee’s use | 5 No. | 1:5 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instruction room | 9m by 8m | 1 No | 1:25 |
| **C** | **Consumable materials** | | | |
|  | Pencils | For trainee’s use | 50 pkts | 2:1 |
|  | Erasers | For trainee’s use | 25 pcs | 1:1 |
|  | Masking tape | For trainee’s use | 25 pcs | 1:1 |
|  | water colour paint | For trainee’s use | 25 pcs | 1:1 |
|  | coloured pencils crayons | For trainee’s use | 25 pcs | 1:1 |
|  | water colour papers | For trainee’s use | 5 reams | 1:5 |
|  | A series papers | For trainee’s use | 5 reams | 1:5 |
|  | embossed papers | For trainee’s use | 5 reams | 1:5 |
|  | oil colour paints | For trainee’s use | 25 pks | 1:1 |
| **D** |  | | | |
|  | Set squares | For trainee’s use | 25 pcs | 1:1 |
|  | 25 Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | 25 scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Drawing board | For trainee’s use | 25 pcs | 1:1 |
|  | Set square | For trainee’s use | 25 pcs | 1:1 |
|  | Compasses | For trainee’s use | 25 pcs | 1:1 |
|  | French curve | For trainee’s use | 25 pcs | 1:1 |
|  | Brushes | For trainee’s use | 25 pcs | 1:1 |
|  | Drawing and drafting tools | For trainee’s use | 25 pcs | 1:1 |
|  | NT cutter | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | Drawing board | For trainee’s use | 25 pcs | 1:1 |

## TECHNICAL DRAWING TECHNIQUES

**UNIT CODE:** **0732 551 03A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply Technical Drawing Techniques**

Duration of Unit: **140 hours**

**Unit Description**

This unit covers the competencies required to prepare and interpret technical drawings. It includes producing plain geometry drawings, producing solid geometry drawings, producing pictorial and orthographic drawings.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOMES | DURATION(HRS) |
|  | Produce plane geometry drawings | 40 |
|  | Produce solid geometry drawings | 40 |
|  | Produce orthographic drawings | 50 |
|  | Produce Pictorial drawings | 50 |
| **TOTAL** | | **180** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Produce plane geometry drawings | * 1. Drawing lines drafting      1. Types of lines         1. Outline         2. Break line         3. Centre line         4. Projection line         5. Hidden detail line   2. Lines and circles division.      1. Equal parts   3. Plane geometric forms construction.      1. Circles      2. Triangles      3. Rectangles      4. Parallelogram      5. Polygons      6. Pyramids      7. conic sections      8. prisms      9. loci   4. Angles construction.   5. Angles bisection.   6. Scales construction | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Produce solid geometry drawings | * 1. Solid geometric forms drafting.      1. Pyramid      2. Cone      3. Cubes      4. Rectangular prisms      5. Sphere   2. Solid geometric forms truncation.      1. Pyramid      2. Cone      3. Cubes      4. Rectangular prisms      5. Sphere   3. Solid geometric forms Auxiliary projection   4. Solid geometric forms Surface development      1. Pyramid      2. Cone      3. Cubes      4. Rectangular prisms      5. Sphere   5. Solid geometric forms modelling      1. Pyramid      2. Cone      3. Cubes      4. Rectangular prisms      5. Sphere | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Produce orthographic drawings | * 1. Freehand Orthographic projection drawings      1. First angle projection.      2. Third angle projection   2. Scaled Orthographic projection drawings production      1. First angle projection.      2. Third angle projection   3. Orthographic elevations dimensioning      1. First angle projection.      2. Third angle projection | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Produce Pictorial drawings | * 1. Isometric drawings production      1. First angle to isometric      2. Third angle to isometric   2. Oblique drawings production.      1. First angle to oblique      2. Third angle to oblique   3. Perspective drawings interpretation and production      1. One point      2. Two-point | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
| 1. | Technical drawing reference books. | For trainee’s use | 14 | 1:2 |
| 2. | Rulers, | For trainer’s use | 2 pcs each | 2:1 |
| 3. | Protractors | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| 4. | set-squares | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| 5. | compasses, | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| 6. | A3 drawing papers | For trainee’s use | 25 pcs | 1:1 |
| 7. | Building Drawings samples | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | computers with the following software:  Windows/Linux/Macintosh Operating System  Microsoft Office Software  Google Workspace Account  Antivirus Software | For both trainer’s and trainee’s use | 25 | 1:1 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Technical Drawing room | 9m by 8m | 1 | 1:25 |
|  | External storage media | For both trainer’s and trainee’s use | 1 | 1:1 |
|  | Projector | For both trainer’s and trainee’s use | 1 | 1:25 |
|  | Printers | For both trainer’s and trainee’s use | 2 | 1:13 |
| **C** | **Consumable materials** | | | |
|  | Assorted colour of whiteboard markers | For trainee’s use | 10 pcs | 10:1 |
|  | Masking Tape | For trainee’s use | 1pc | 25:1 |
|  | Drawing stationery | For trainee’s use | 25 pcs per stationery | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Technical Drawing Instruments | For trainee’s use | 25 pcs | 1:1 |
|  | Drawing Board | For trainee’s use | 25 pcs | 1:1 |

## COMMUNICATION SKILLS

**UNIT CODE:** **0031 541 04A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: 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 communication skills, non-verbal skills, oral, and group communication skills.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| **S/NO** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | To Apply Communication Channels. | 4 |
| **2.** | To Apply Written Communication Skills. | 10 |
| 3. | To Apply Non-Verbal Skills. | 6 |
| 4. | To Apply Oral Communication Skills. | 8 |
| **5.** | To Apply Group Communication Skills. | 12 |
|  |  | **TOTAL 40HRS** |

**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 * Observation * 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 * Observation * 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 * Observation * 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 * Observation * 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 | * Oral assessemnt * Written assessment * Observation * Portfolio of Evidence * Practical assessment |

**Suggested Methods of Instruction**

· Discussion

* Roleplaying
* Simulation
* Direct instruction
* Demonstration
* Field trips
* Viewing of related videos

**Recommended Resources for 25 trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
| 1. 1. | Charts | · Flip Charts  · Rules and Regulations | 5 | 1:5 |
| 1. 2. | Report Writing Templates | Printed copies and softcopies | 25 | 1:1 |
| 1. 3. | Assorted Markers | whiteboard markers and permanent | 50 | 1:1 |
| 1. 4. | Samples Of CVS | Printed copies and softcopies | 5 | 1:5 |
| 1. 5. | External Storage Media | Flash disks, Compass Disks; Re-Writable | 1 | 1:25 |
| 1. 6. | Smartboard/Smart TV (Where Applicable) | LCD or projector | 20 | 1:25 |
| **B** | **Learning Facilities & Infrastructure** | | | |
| 7. | Lecture/Theory Room | (9\* 8 sq. metres) | 1 | 1:25 |
| 8. | Workshop | (10\* 15 sq. metres) | 1 | 1:25 |
| 9. | Internet Connection | WI-FI, Dial-Up, Cable, Fixed-wireless, | 1 | 1:25 |
| **C** | **Consumable Materials** | | | |
| 10. | Flashcards | Alphabet, Numbers, Math | 25 | 1:1 |
|  | Printing Papers | Sizes A4, A3, A2 etc | 5 reams | 1:5 |
| **D** | **Tools And Equipment** | | | |
|  | Computers/Laptops | Any model | 1 | 1:25 |
|  | Projector | LED.LCD, Laser | 5 | 1:5 |
|  | Printer | Inkjet, LaserJet | 1 | :25 |
|  | Computers Software: | •Windows/Linux/Macintosh Operating System  •Microsoft Office Software  •Google Workspace Account  Antivirus Software | 1 | 1:1 |
|  | Whiteboard | Glass, melamine, porcelain | 1 | 1:25 |
|  | Mobile Phones | Smartphones | 5 | 1:5 |

# MODULE 2

## DIGITAL ARCHITECTURAL MODEL

**UNIT CODE: 0731 551 05A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Produce Digital Architectural Model**

Duration of Unit: **120 hours**

**Unit Description**

This unit covers the competencies required by an Architectural technician to produce a digital architectural model. It includes; producing exterior render, producing interior render, and Producing project animation.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOMES | DURATION(HRS) |
|  | Produce exterior render. | 40 |
|  | Produce interior render. | 40 |
|  | Produce project animation. | 40 |
| **TOTAL** | | **120** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Produce exterior render. | * 1. Architectural rendering tools and equipment.      1. Computer      2. Printer      3. Ploter      4. Archicad      5. Revit      6. Sketch- up      7. Twin motion      8. Lumion      9. D5 render      10. Blender      11. Artlantis   2. Architectural rendering drawings preparation.      1. Interior renders      2. Exterior renders   3. Exterior 3D models preparation.      1. Residential buildings      2. Commercial buildings      3. Public buildings      4. Industrial buildings   4. Architectural rendering printouts generation.      1. Perspectives      2. 3D images      3. Site layout plan | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 2. Produce interior render. | * 1. Modelling tools and materials assembling.      1. Computer      2. Printer      3. Ploter      4. Archicad      5. Revit      6. Sketch- up      7. Twin motion      8. Lumion      9. D5 render      10. Blender      11. Artlantis   2. Modelling component schedule preparation.   2.2.1 Schedule parameters   * + - 1. Component name       2. Size       3. Scale       4. Materials required   1. Architectural physical modelling.      1. Conceptual models      2. Presentation models      3. Construction models      4. Detail models | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 3. Produce project animation. | * 1. Architectural animation software identification.      1. Twin motion      2. Lumion      3. D5 render      4. Blender      5. Artlantis   2. Architectural model selection.   3. Project finishes identification.   4. Landscaping elements identification.      1. Cladding materials      2. Floor finishes      3. Paving material      4. Roof finishes      5. paints   5. Project animation generation.      1. Exterior walkthrough      2. Interior walkthrough      3. Fly-through | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Architectural modelling reference books | For trainee’s use | 5 No. | 1:5 |
|  | NT cuter | For trainer’s use | 25 pcs | 1:1 |
|  | Scaled Trees | For trainee’s use | 250 pcs | 10:1 |
|  | Human scale figures | For trainee’s use | 250 pcs | 1:1 |
|  | Scaled vehicle models | For trainee’s use | 250 pcs | 10.1 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instruction room | 9m by 8m | 1 No | 1:25 |
|  | Studio room | 9m x 8m | 1 No | 1:25 |
| **C** | **Consumable materials** | | | |
|  | 5 reams of A2 drawing paper | For trainee’s use | 5 reams | 1:1 |
|  | 25 packets of coloured pencil | For trainee’s use | 25 pkts | 1:1 |
|  | 25 packets of watercolours | For trainee’s use | 25 pkts | 1:1 |
|  | 25 packets of B pencil series | For trainee’s use | 25 pkts | 1:1 |
|  | 10 reams of watercolour papers | For trainee’s use | 10 reams | 1:13 |
|  | 2 reams of transparencies | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of embossed papers | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of mounting boards | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of forex boards | For trainee’s use | 2 reams | 1:13 |
|  | Adhesives | For trainee’s use | 25 pcs | 1:1 |
|  | Rolls Flip Charts | For both trainer’s and trainee’s use | 5 pcs | 1:5 |
|  | 100 m grass mart roll | For trainee’s use | 100 m | 4:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |
|  | Printer | For trainee’s use | 1 pcs | 1:25 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | Camera | For trainee’s use | 2 pcs | 1:13 |
|  | Laser distance measure | For trainee’s use | 25 pcs | 1:1 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |

## COMPUTER-AIDED DESIGN DRAWING TECHNIQUES

**UNIT CODE: 0731 551 06A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency**: Apply Computer Aided Design Drawing Techniques**

Duration of Unit:**130 hours**

**Unit Description**

**UNIT DESCRIPTION**

This unit covers the competencies required to produce computer-aided drawings. It involves drafting computer aided building floor plan, drafting computer aided building elevation drawing, drafting computer aided building section drawing, producing computer aided building details.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Draft computer-aided building floor plan drawing | 40 |
|  | Draft computer-aided building elevation drawing | 30 |
|  | Draft Computer-aided building section drawing | 30 |
|  | Conduct an architectural project activity study. | 30 |
| **TOTAL** | | **130** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Draft computer-aided building floor plan drawing | * 1. Drafting Softwares      1. AutoCAD      2. Revit      3. ArchiCAD      4. Atlantis      5. Piranesi      6. Lumion   2. Floor Plan settings adjustment.   Elements   * + 1. Walling     2. Slab     3. Mesh     4. Doors and     5. windows   1. Floor plan layout detailing.      1. Dimensioning      2. Labeling      3. Furniture layout      4. Sanitary fittings | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Draft computer aided building elevation drawing | * 1. Elevation settings.      1. Height      2. Doors and      3. windows setting.   2. Sight of elevation establishment.   3. Elevation drawing rendering.      1. Wall renders      2. Roof renders   4. Elevation drawing detailing.      1. Dimensioning      2. Labels | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Draft Computer-aided building section drawing | * 1. Section settings adjustment.      1. Height      2. Detailing   2. Line of Section Establishment   3. Section drawing rendering.      1. Render of cut &      2. uncut members   4. Section drawing detailing.      1. Dimensioning      2. Labelling | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Produce computer-aided building details | * 1. Building detail part identification.      1. Foundation details      2. Windows      3. Doors      4. Eaves      5. Sills      6. Fittings and      7. fixtures   2. Building detail drafting.      1. Sectioning   3. Detail drawing annotation.      1. Dimensioning      2. Labelling | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practical
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
| 1. | Technical drawing reference books. | For trainee’s use | 14 | 1:2 |
| 2. | Rulers, | For trainer’s use | 2 pcs each | 2:1 |
| 3. | Protractors | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| 4. | set-squares | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| 5. | compasses, | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| 6. | A3 drawing papers | For trainee’s use | 25 pcs | 1:1 |
| 7. | Building Drawings samples | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | computers with the following software:  Windows/Linux/Macintosh Operating System  Microsoft Office Software  Google Workspace Account  Antivirus Software | For both trainer’s and trainee’s use | 25 | 1:1 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Technical Drawing room | 9m by 8m | 1 | 1:25 |
|  | External storage media | For both trainer’s and trainee’s use | 1 | 1:1 |
|  | Projector | For both trainer’s and trainee’s use | 1 | 1:25 |
|  | Printers | For both trainer’s and trainee’s use | 2 | 1:13 |
| **C** | **Consumable materials** | | | |
|  | Assorted colour of whiteboard markers | For trainee’s use | 10 pcs | 10:1 |
|  | Masking Tape | For trainee’s use | 1pc | 25:1 |
|  | Drawing stationery | For trainee’s use | 25 pcs per stationery | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Technical Drawing Instruments | For trainee’s use | 25 pcs | 1:1 |
|  | Drawing Board | For trainee’s use | 25 pcs | 1:1 |

## MATHEMATICS FOR ARCHITECTS I

**UNIT CODE: 0541 541 07A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply Mathematics for Architects**

Duration of Unit: **180 hours**

**Unit Description**

This unit describes the competencies a technician requires to apply engineering mathematics. It involves applying algebra, applying trigonometry and hyperbolic functions, performing coordinate geometry, carrying out mensuration, applying vector theory and applying matrixes

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Apply algebra | 30 |
|  | Apply trigonometry and hyperbolic functions | 30 |
|  | Perform coordinates geometry | 30 |
|  | Carry out mensuration | 30 |
|  | Apply vector theory | 30 |
|  | Apply matrix | 30 |
| **TOTAL** | | **180** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply algebra | * 1. Indices calculations      1. Laws of Indices         1. Multiplication law         2. Division         3. Power of a power         4. Zero power         5. Negative power   2. Logarithms calculations      1. Laws of logarithms         1. Multiplication law         2. Division         3. Addition         4. Change of base   3. Simultaneous equations      1. Complete square method      2. Graphical method      3. Elimination method      4. Substitution method      5. Matrix method   4. Quadratic equations      1. Separation of variables      2. Linear equations      3. Homogenous equations | * Practical Assessment * Third-Party Report * Written tests |
| 1. Apply trigonometry and hyperbolic | * 1. Right-angled triangles.   2. Acute and obtuse angles triangles.   3. Angles of elevation and depression calculations   4. Calculations of hyperbolic functions   5. Trigonometric equations   6. Sin and cosine graphs      1. Sinh x      2. Cosh x      3. Cosec x      4. Coth x      5. Tanh x      6. Sech x | * Practical Assessment * Third-Party Report * Written tests |
| 1. Perform coordinates geometry | * 1. Polar equations   2. Graphs of polar equations   3. Normal and tangents (coordinate geometry) | * Practical Assessment * Third-Party Report * Written tests |
| 1. Carry out mensuration | * 1. Perimeter and areas of regular figures      1. Addition      2. Subtraction      3. Multiplication      4. Division   2. Areas of irregular figures   3. Volume and surface area of solids | * Practical Assessment * Third-Party Report * Written tests |
| 1. Apply vector theory | * 1. Vectors and scalar quantities   2. Vector algebra calculations   3. Gradient, Divergence and Curl | * Practical Assessment * Third-Party Report * Written tests |
| 1. Apply matrix | * 1. Mathematical matrix operation   2. Inverse of square matrices   3. Matrix simultaneous calculation | * Practical Assessment * Third-Party Report * Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  **(Item: Trainee)** |
| A | Learning Materials | | | |
|  | Mathematical tables (SMP TABLE) | For both trainer’s and trainees’ use | 25 | 1:1 |
|  | Mathematics reference books | For trainee’s use | 14 | 1:2 |
|  | Rulers | For both trainer’s and trainees’ use | 1 pcs each | 1:1 |
|  | Protractors | For both trainer’s and trainees’ use | 1 pcs each | 1:1 |
|  | compasses | For both trainer’s and trainees’ use | 1 pcs each | 1:1 |
|  | set-squares | For both trainer’s and trainees’ use | 1 pcs each | 1:1 |
|  | Calculators | For trainee’s use | 25 | 1:1 |
|  | 2 reams of graph paper | For both trainer’s and trainees’ use | 25 pcs | 1:13 |
| B | Learning Facilities & Infrastructure | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instructions room | 9m by 8m | 1 | 1:25 |
| C | Consumable materials | | | |
|  | Assorted colour of whiteboard markers | For trainee’s use | 10 pcs | 10:1 |
|  | Graph paper | For trainee’s use | 2 reams | 1:13 |
| D | Tools and Equipment | | | |
|  | Rulers | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | Protractors | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | compass | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | set-squares | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | Calculators | For trainee’s use | 25 | 1:1 |

**DIGITAL LITERACY**

**UNIT CODE: 0611 551 08A**

**UNIT DURATION:** 40 Hours

**Relationship to Occupational Standards**

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

**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 cybersecurity skills and job entry techniques, and performing jobs online.

**Summary of Learning Outcomes**

|  |  |
| --- | --- |
| **Learning Outcomes** | **DURATION (HOURS)** |
| 1. Operate Computer Devices | **6** |
| 1. Solve Tasks Using Office Suite | **4** |
| 1. Manage Data and Information | **6** |
| 1. Perform Online Communication and Collaboration | **4** |
| 1. Apply Cyber security Skills | **4** |
| 1. Perform Online Jobs | **4** |
| 1. Apply job entry techniques. | **2** |
| **TOTAL** | 40 HO**URS** |

**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 Techniques   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) | 1. Observation 2. Written assessment 3. Oral assessment 4. Practical assessment |
| 1. Solve tasks using Office suite | * 1. Meaning and Importance of Word Processing   2. Examples of Word Processors   3. Working with word documents      1. Open and close word processor      2. Create a new document      3. Save a document      4. Switch between open documents   4. Enhancing productivity      1. Set basic options/preferences      2. Help resources      3. Use magnification/zoom tools      4. Display, hide built-in tool bar      5. Using navigation tools   5. Typing Text   6. Document editing (copy, cut, paste commands, spelling and Grammar check)   7. Document formatting      1. Formatting text      2. Formatting paragraph      3. Formatting styles      4. Alignment      5. Creating tables      6. Formatting tables   8. Graphical objects      1. Insert object (picture, drawn object)      2. Select an object      3. Edit an object      4. Format an object   9. Document Print setup      1. Page layout,      2. Margins set up      3. Orientation.   10. Word Document Printing   11. Meaning & Importance of electronic spreadsheets   12. Components of Spreadsheets   13. Application areas of spreadsheets   14. Using spreadsheet application.       1. Parts of Excel screen: ribbon, formula bar, active cell, name box, column letter, row number, Quick Access Toolbar.       2. Cell Data Types       3. Block operations       4. Arithmetic operators (formula bar (-, +, \*, /).       5. Cell Referencing   15. Data Manipulation       1. Using Functions (Sum, Average, Sum IF, Count, Max, Max, IF, Rank, Product, mode etc.)       2. Using Formulae       3. Sorting data       4. Filtering data       5. Visual representation using charts   16. Worksheet printing   17. Electronic Presentations   18. Meaning and Importance of electronic presentations   19. Examples of Presentation Software   20. Using the electronic presentation application       1. Parts of the PowerPoint screen (slide navigation pane, slide pane, notes, the ribbon, quick access toolbar, and scroll bars).       2. Open and close presentations       3. Creating Slides (Insert new slides, duplicate, or reuse slides.)       4. Text Management (insert, delete, copy, cut and paste, drag and drop, format, and use spell check).       5. Use magnification/zoom tools       6. Apply or change a theme.       7. Save a presentation       8. Switch between open presentations   21. Developing a presentation       1. Presentation views       2. Slides       3. Master slide   22. Text       1. Editing text       2. Formatting       3. Tables   23. Charts       1. Using charts       2. Organization charts   24. Graphical objects       1. Insert, manipulate       2. Drawings   25. Prepare outputs   Applying slide effects and transitions   * 1. Check and deliver      1. Spell check a presentation      2. Slide orientation      3. Slide shows, navigation   2. Print presentations (slides and handouts) | 1. Observation 2. Portfolio of Evidence 3. Project 4. Written assessment 5. Practical assessment 6. Oral assessment |
| 1. Manage Data and Information | * 1. Meaning of Data and information   2. Importance and Uses of data and information   3. Types of internet services      1. Communication Services      2. Information Retrieval Services      3. File Transfer      4. World Wide Web Services      5. Web Services      6. Automatic Network Address Configuration      7. Newsgroup      8. Ecommerce   4. Types of Internet Access Applications   5. Web browsing concepts   Key concepts  Security and safety   * 1. Web browsing      1. Using the web browser      2. Tools and settings      3. Clearing Cache and cookies      4. URIs      5. Bookmarks      6. Web outputs   2. Web based information      1. Search      2. Critical evaluation of information      3. Copyright, data protection   3. Downloads Management   4. Performing Digital Data Backup (Online and Offline)   5. Emerging issues in internet | 1. Observation 2. Portfolio of Evidence 3. Practical assessment 4. Project 5. Written assessment 6. 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   5. Online collaboration tools      1. Online Storage (Google Drive)      2. Online productivity applications (Google Docs & Forms)      3. Online meetings (Google Meet/Zoom)      4. Online learning environments      5. Online calendars (Google Calendars)      6. Social networks (Facebook/Twitter - Settings & Privacy)   6. Preparation for online collaboration   Common setup features  Setup   * 1. Mobile collaboration      1. Key concepts      2. Using mobile devices      3. Applications      4. Synchronization | 1. Observation 2. Portfolio of Evidence 3. Project 4. Written assessment 5. Practical assessment 6. 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 | 1. Observation 2. Portfolio of Evidence 3. Project 4. Written assessment 5. Practical assessment 6. Oral assessment |
| 1. Perform Online Jobs | * 1. Introduction to online working   2. Types of online Jobs   3. Online job platforms      1. Remo task      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. | 1. Observation 2. Portfolio of Evidence 3. Project 4. Written assessment 5. Practical assessment 6. 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 an 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 | 1. Observation 2. Oral assessment 3. Portfolio of evidence 4. Third party report 5. Written assessment |

**Suggested Methods Instruction**

* + Instructor-led facilitation using active learning strategies
  + Demonstration by trainer
  + Practical work by trainees
  + Viewing of related videos
  + Group discussions
  + Project
  + Role play
  + Case study

**Recommended Resources for 25 Trainees**

| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| --- | --- | --- | --- | --- |
| **A** | **Learning Materials** |  |  |  |
|  | Textbooks | Recommended publisher | 8 pcs | 1:3 |
|  | Samples of CVs | Various formats | 5 | 1:5 |
|  | Internet connection | Reliable | - | - |
|  | White board | For trainer’s use | 1 | - |
| **B** | **Learning Facilities & infrastructure** |  |  |  |
|  | Lecture/theory room | 72 Square Meter | 1 | 1:25 |
|  | Computer Lab | 96 Square Meter | 1 | 1:25 |
| **C** | **Consumable materials** |  |  |  |
|  | Ink | Assorted Colours for trainer’s use | 500ml per term | - |
|  | White board Marker | Refillable type | 10 pcs per term | - |
|  | Printing papers | sufficient | - | - |
| **D** | **Tools and Equipment** |  |  |  |
|  | Computers | Latest version with:  Windows/Linux/Macintosh Operating System, Microsoft Office Software, Google Workspace Account, Antivirus Software | 25 | 1:1 |
|  | Projector | Latest version | 1 | 1:25 |
|  | External storage media | Latest version | 25 | 1:1 |
|  | Laptop | Intel core i5 | 25 | 1:1 |
|  | printers | Latest version | 2 | 1:13 |

# MODULE 3

## MATHEMATICS FOR ARCHITECTS II

**UNIT CODE:** **0731 551 09A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply Mathematical for Architects II**

Duration of Unit: **94 hours**

**Unit Description**

This unit describes the competencies a technician requires to apply engineering mathematics. It involves applying complex numbers, carrying out binomial expansion, applying calculus, applying power series, applying statistics, applying numerical methods, and solving ordinary differential equations.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Complex numbers | 12 |
|  | Binomial expansion | 10 |
|  | Calculus | 20 |
|  | Power series | 14 |
|  | Statistics | 12 |
|  | Numerical method | 12 |
|  | Ordinary differential equations | 14 |
| **TOTAL** | | **94** |

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

|  |  |  |
| --- | --- | --- |
| Learning Outcome | Content | Suggested Assessment Methods |
| 1. Perform complex number operations | * 1. Real and Imaginary Numbers      1. Understanding complex numbers in the form a + bi   2. Argand Diagram Representation      1. Plotting complex numbers on the Argand plane      2. Polar and rectangular forms   3. Polar Form of Complex Numbers      1. Conversion between polar and rectangular forms      2. Modulus and argument of complex numbers   4. Operations on Complex Numbers      1. Addition, subtraction, multiplication, and division of complex numbers      2. Complex conjugates   5. De Moivre’s Theorem      1. Powers and roots of complex numbers      2. Application in solving polynomial equations | * Practical Assessment * Third-Party Report * Written tests |
| 1. Binomial Expansion | * 1. Binomial Theorem      1. Expansion of (a + b) n using the binomial theorem      2. Binomial coefficients and their calculation   2. Pascal’s Triangle      1. Relationship between Pascal’s triangle and binomial coefficients   3. Binomial Series Coefficients      1. Expansion of binomial expressions with fractional and negative powers   4. Errors in Binomial Expansion      1. Use of binomial expansion to approximate values      2. Estimation of small changes   5. Real-life Applications      1. Use in financial calculations (compound interest)      2. Error minimization in physics and engineering problems | * Practical Assessment * Third-Party Report * Written tests |
| 1. Calculus | * 1. Differentiation of Algebraic Functions      1. Rules of differentiation (power, product, quotient, chain rules)   2. Differentiation of Trigonometric and Hyperbolic Functions      1. Derivatives of sine, cosine, tangent, sinh, cosh, etc.   3. Inverse Trigonometric Functions      1. Derivatives of arcsin, arccos, arctan   4. Rate of Change      1. First and second derivatives as rates of change      2. Real-life applications (velocity, acceleration)   5. Stationary Points      1. Maxima, minima, and points of inflection      2. Applications in optimization problems   6. Integration of Algebraic Functions      1. Definite and indefinite integrals      2. Application of integration in finding areas   7. Integration of Trigonometric and Hyperbolic Functions      1. Techniques of integration involving trigonometric functions      2. Integration by Substitution   8. Integration of Logarithmic Functions      1. Finding the integral of logarithmic expressions   9. Applications of Calculus      1. Calculating areas under curves      2. Volume of solids of revolution | * Practical Assessment * Third-Party Report * Written tests |
| 1. Power series | * 1. Taylor Series      1. Expansion of functions around a point using Taylor’s theorem   2. Maclaurin Series      1. A special case of Taylor series about x = 0   3. Power Series Convergence      1. Determining the convergence of power series   4. Application of Power Series      1. Approximation of functions using power series in physics and engineering | 1. Practical Assessment 2. Third-Party Report 3. Written tests |
| 1. Statistics | * 1. Data Identification, Collection and Organization      1. Methods of identifying, collecting and organizing data   2. Data presentation      1. Tables, Bar Charts, Histograms, Pie Charts, Line Graphs   3. Measures of Central Tendency      1. Mean, median, mode, and range calculations   4. Measures of dispersion      1. Range, Variance, Standard Deviation   5. Probability Laws      1. Rules of probability, including conditional probability   6. Probability Distributions      1. Normal distribution, binomial distribution, Poisson distribution   7. Sampling Distribution      1. Methods of sampling and sampling distributions   8. Confidence Intervals      1. Determining confidence intervals for population parameters   9. Hypothesis Testing      1. Testing hypotheses using large and small sample sizes   10. Correlation and Regression       1. Determining Correlation Coefficients       2. Simple linear regression analysis | 1. Practical Assessment 2. Third-Party Report 3. Written tests |
| 1. Numerical method | * 1. Numerical Methods Identification      1. Overview of numerical analysis techniques   2. Roots of Polynomials      1. Solving polynomial equations using numerical methods (Newton-Raphson, bisection, and algebraic)   3. Interpolation and Extrapolation      1. Estimating values between or outside known data points using Lagrange’s interpolation   4. Numerical Integration      1. Approximate solutions to definite integrals using numerical techniques (Trapezoidal and Simpson’s rules | 1. Practical Assessment 2. Third-Party Report 3. Written tests |
| 1. Ordinary differential equations | * 1. First-Order Differential Equations      1. Methods of Solving first-order ODEs.      2. Separation of variables      3. Integrating factor   2. Second**-**Order Differential Equations      1. Homogeneous      2. Non-homogeneous second-order ODEs   3. BoundaryConditions      1. Applying initial or boundary conditions to solve ODEs   4. Applications of ODEs      1. Real-life applications in physics, engineering (e.g., motion of particles, electrical circuits) | 1. Practical Assessment 2. Third-Party Report 3. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S/No. | Category/Item | Description/ Specifications | Quantity | Recommended Ratio  (Item: Trainee) |
| A | Learning Materials | | | |
|  | Mathematical tables (SMP TABLE) | For both trainer’s and trainees’ use | 25 | 1:1 |
|  | Mathematics reference books | For trainee’s use | 14 | 1:2 |
|  | Rulers | For both trainer’s and trainees’ use | 1 pcs each | 1:1 |
|  | Protractors | For both trainer’s and trainees’ use | 1 pc each | 1:1 |
|  | compasses | For both trainer’s and trainees’ use | 1 pc each | 1:1 |
|  | set-squares | For both trainer’s and trainees’ use | 1 pc each | 1:1 |
|  | Calculators | For trainee’s use | 25 | 1:1 |
|  | 2 reams of graph paper | For both trainer’s and trainees’ use | 25 pcs | 1:13 |
| B | Learning Facilities & Infrastructure | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instructions room | 9m by 8m | 1 | 1:25 |
| C | Consumable materials | | | |
|  | Assorted colour of whiteboard markers | For trainee’s use | 10 pcs | 10:1 |
|  | Graph paper | For trainee’s use | 2 reams | 1:13 |
| D | Tools and Equipment | | | |
|  | Rulers | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | Protractors | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | compass | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | set-squares | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | Calculators | For trainee’s use | 25 | 1:1 |

## ARCHITECTURAL LANDSCAPING

**UNIT CODE: 0732 551 10A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Carry out Architectural Landscaping**

Duration of Unit: **120 hours**

**Unit Description**

This unit covers the competencies an Architectural technician requires to carry out architectural landscaping. It includes; designing architectural landscaping layouts, preparing architectural landscaping elements schedule, preparing architectural landscaping sites, and installing architectural landscaping elements

**Summary of Learning Outcome**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOMES | DURATION(HRS) |
|  | Design architectural landscaping layout | 30 |
|  | Prepare architectural landscaping elements schedule | 30 |
|  | Prepare architectural landscaping site | 30 |
|  | Install architectural landscaping elements | 30 |
| **TOTAL** | | **120** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Design architectural landscaping layout | * 1. Client landscaping requirements documentation.      1. Client information         1. Name         2. Property address         3. Contact information   2. Project timeline      1. Property details         1. Property size         2. Soil type         3. Water availability         4. Drainage   3. Landscaping cost and timelines estimation.      1. Budget      2. Breakdown of cost         1. Plants         2. Materials         3. labour   4. Landscaping Layout Design.      1. Elements of landscaping layout         1. Existing structure         2. Property boundary         3. Sun exposure         4. Drainage patterns         5. Plant placement         6. Water features (fountains)         7. Outdoor living space. | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 2. Prepare architectural landscaping elements schedule | 1. Landscaping planting elements quantification.   2.1.1 Trees   * + 1. Shrubs     2. Flowers     3. Climbers  1. Hardscaping elements quantifying.    * 1. Cabro      2. Channels      3. Retaining walls      4. Walkways/paths      5. Driveways      6. Fences      7. Gates      8. Water features      9. concrete pavings      10. Stone pavings      11. Garden lightings      12. Moulds      13. Sculptures 2. Planting and Hardscaping elements specification.    * 1. Planting specifications         1. Plant species and cultivars         2. Planting location         3. Spacing and quantities         4. Soil requirements         5. Irrigation needs      2. Hardscaping elements         1. Materials – concrete, stones and wood.         2. Dimension and quantities         3. Construction methods         4. Drainage and erosion control measures. | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 3. Prepare architectural landscaping site | * 1. Tools and equipment assembling.      1. Pangas      2. Jembes      3. Shovels      4. Plows      5. Husks      6. Rakes      7. Wheelbarrows      8. Machetes   2. Rocks and boulders removal.      1. Methods      2. Manual removal      3. Mechanical removal      4. Blasting      5. Site vegetation removal.      6. Methods         1. Manual removal         2. Mechanical removal         3. Chemical control(herbicides)         4. Landscaping site ploughing         5. Manual ploughing         6. Mechanical ploughing   3. Landscaping site manure application      1. Methods         1. Direct application         2. Composting   4. Landscaping Site Excavation.      1. Manual excavation      2. Mechanical excavation      3. Types of excavation         1. Shallow         2. Deep         3. Oversite         4. Utility trenching. | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 4. Install architectural landscaping elements | * 1. Landscaping planting elements assembling.      1. Flowers      2. Shrubs      3. Trees      4. grass   2. Hardscaping elements assembling.      1. Flowers      2. Shrubs      3. Trees      4. grass   3. Landscaping elements setting out.      1. **Setting out steps**         1. Design plan review         2. Equipment assembling         3. Establish reference points         4. Measure and mark         5. Check alignment         6. Adjust as needed.   4. Planting and hardscaping elements installation.      1. Elements of installation         1. Planning and design         2. Preparation of the site         3. Installing hardscaping elements         4. Installing planting bands         5. Adding soil and plants | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Architectural design reference books | For trainee’s use | 5 No. | 1:5 |
|  | NT cuter | For trainer’s use | 25 pcs | 1:1 |
|  | Scaled Trees | For trainee’s use | 250 pcs | 10:1 |
|  | Human scale figures | For trainee’s use | 250 pcs | 1:1 |
|  | Scaled vehicle models | For trainee’s use | 250 pcs | 10.1 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instruction room | 9m by 8m | 1 No | 1:25 |
|  | Studio room | 9m x 8m | 1 No | 1:25 |
| **C** | **Consumable materials** | | | |
|  | 5 reams of A2 drawing paper | For trainee’s use | 5 reams | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |
|  | Printer | For trainee’s use | 1 pcs | 1:25 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | Camera | For trainee’s use | 2 pcs | 1:13 |
|  | Laser distance measure | For trainee’s use | 25 pcs | 1:1 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | 15 Pangas |  | 15 | 2:1 |
|  | 15 Jembes |  | 15 | 2:1 |
|  | 15 Shovels |  | 15 | 2:1 |
|  | 1 Plows |  | 1 | 1:25 |
|  | 15 Husks |  | 15 | 2:1 |
|  | 5 Rakes |  | 5 | 1:5 |
|  | 2 Wheelbarrows |  | 2 | 1:13 |
|  | 15 machetes |  | 15 | 1:13 |
|  | 15 transplanting spades |  | 15 | 1:13 |
|  | 5 hand tampers |  | 5 | 5:1 |

## HISTORY OF ARCHITECTURE

**UNIT CODE: 0731 551 11A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply History of Architecture Concepts**

Duration of Unit: **90 hours**

**Unit Description**

This unit covers the principles required by an architectural technician in applying the history of architecture concepts. It includes applying; architectural contextual meaning concepts, ancient cultures architectural languages, architectural Industrial Revolution concepts, architectural modern movement principles, traditional architecture concepts n and architectural Postmodern concepts.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Apply architectural contextual concepts. | 15 |
|  | Apply ancient cultures' architectural languages | 15 |
|  | Apply the architectural Industrial Revolution concept. | 15 |
|  | Apply architectural modern movement principles. | 15 |
|  | Apply architectural postmodern concepts. | 15 |
|  | Apply Traditional architecture concepts. | 15 |
| **TOTAL** | | **90** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Architectural contextual concepts | * 1. Architectural contextual concepts identification.      1. Contextual meaning in architecture      2. Contextual forces         1. Cultural forces         2. Sociological forces         3. Environmental forces         4. Economic forces         5. Technological forces   2. Architectural contextual concepts documented.      1. Contextual forces         1. Cultural forces         2. Sociological forces         3. Environmental forces         4. Economic forces         5. Technological forces   3. Architectural designs development.      1. Parameters that influence architecture of a given society         1. Cultural forces         2. Sociological forces         3. Environmental forces         4. Economic forces         5. Technological forces | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Ancient cultures architectural languages | * 1. Ancient Architectural built forms identification      1. Egyptian      2. Greek      3. Romans      4. Gothic      5. Renaissance      6. Romanesque      7. Baroque      8. Islamic   2. Ancient architectural forms documentation.      1. Typologies      2. Shape      3. Size   3. Architectural design development.      1. Ancient architectural languages         1. Egyptian         2. Greek         3. Romans         4. Gothic         5. Renaissance         6. Romanesque         7. Baroque         8. Islami | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Architectural Industrial Revolution concept. | * 1. Industrial Revolution principles identification.      1. Effects of Industrial Revolution.      2. Materials revolution         1. Steel         2. Glass         3. Ornamentation         4. Concrete   2. Industrial Revolution principles documentation.      1. Industrial revolution movements         1. Art and craft         2. Art nouveua         3. De stjil   3. Architectural designs development.      1. Building typologies         1. Crystal palace         2. Eifel towers | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Architectural modern movement principles. | * 1. Modern movement principles identification.      1. Function over form      2. Less is more      3. Truth of material      4. Plan      5. Machine aesthetic      6. Use of natural light   2. Modern movement principles documentation.      1. Function over form      2. Less is more      3. Truth of material      4. Plan      5. Machine aesthetic      6. Use of natural light   3. Architectural design development.      1. Building typologies         1. Farnsworth House         2. Villa Savoye         3. Seagram building         4. Norte dame De’ Haut         5. Unite         6. De ’habitation         7. Falling waters | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Architectural Postmodern concepts. | * 1. Postmodern architectural concepts identification.      1. Characteristics of postmodern architecture         1. Eclecticism         2. Historical reference         3. Ornamentation         4. Irony and humour         5. Complexity   2. Postmodern architectural concepts documentation.      1. Eclecticism      2. Historical reference      3. Ornamentation      4. Irony and humour      5. Complexity   3. Architectural design development.      1. Building typologies         1. Vanna Venturi house         2. Teatro del Silenzio         3. Van Brunt apartment         4. Sony tower         5. The Portland Building      2. Architects         1. Robert Venture         2. Phillip Johnson         3. Michael Graves         4. Charles Moore         5. Aldo Rosi | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Traditional architecture concepts. | * 1. Traditional architectural concept identification.      1. Building typologies      2. Built form      3. homestead   2. Traditional architectural concepts documentation.      1. Building typologies      2. Built form      3. homestead   3. Architectural design development.      1. Homestead      2. Built form      3. Traditional languages         1. Kikuyu traditional architecture         2. Masai traditional architecture         3. Kamba traditional architecture         4. Mijikenda traditional architecture         5. Luo traditional architecture         6. Swahili architecture      4. Evolution of traditional architecture | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

Suggested Methods of Instruction

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Scientific calculators | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
|  | History of architecture reference books | For trainee’s use | 14 | 1:2 |
|  | Rulers, protractors and compasses, set-squares | For trainer’s use | 1 pcs each | 1:1 |
|  | A3 drawing papers | For trainee’s use | 25 pcs | 1:1 |
|  | Building Drawings samples | For both trainer’s and trainee’s use | 25 pcs | 1:1 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Technical Drawing room | 9m by 8m | 1 | 1:25 |
| **C** | **Consumable materials** | | | |
|  | Assorted colour of whiteboard markers | For trainee’s use | 10 pcs | 10:1 |
|  | Masking Tape | For trainee’s use | 1pc | 25:1 |
|  | Drawing stationery | For trainee’s use | 25 pcs per stationery | 1:1 |
|  | colored pencils | For trainee’s use | 25 psc | 1:1 |
|  | Erasers | For trainee’s use | 25 psc | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Technical Drawing Instruments | For trainee’s use | 25 pcs | 1:1 |
|  | Drawing Board | For trainee’s use | 25 pcs | 1:1 |
|  | NT cutter |  | 25 | 1:1 |

## ENGINEERING SURVEY PRINCIPLES

**UNIT CODE: 0731 551 12A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply Engineering Survey Principles**

**Duration of Unit:**  **150** **hours**

**Unit Description**

This unit covers the principles required by an architectural technician when applying engineering survey principles. These principles include applying survey linear measurement survey levelling, conducting surveying levelling, carrying out surveying earthworks, applying survey setting out works.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Apply to survey linear measurement principles | 30 |
|  | Conduct surveying levelling principles | 40 |
|  | Carry out surveying earthworks | 40 |
|  | Apply to survey setting out works | 40 |
| **TOTAL** | | **150** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply survey linear measurement principles | * 1. Surveying linear measurements tools and equipment      1. Tape measure      2. Measuring wheel      3. Total station      4. Automatic level   2. Surveying linear measurement principles      1. Tape measurement      2. Pacing measurement      3. Electronic distance measurement   3. Linear measurements documentation | * Practical Assessment * Project * Third-Party Report * Written tests |
| 1. Conduct surveying levelling principles | * 1. Levelling tools and      1. Automatic level      2. Dumpy level      3. Levelling staff   2. Surveying levelling principles   3. Levelling measurements      1. Horizontal      2. vertical | * Practical Assessment * Project * Third-Party Report * Written tests |
| 1. Carry out surveying earthworks | * 1. Surveying earthworks tools and equipment      1. Surveying rods      2. Levelling instruments      3. Measuring tools   2. Earthworks measurement      1. Cuts      2. Fills      3. Cut and fill   3. Earthworks documentation | * Practical Assessment * Project * Third-Party Report * Written tests |
| 1. Apply surveying setting out works | * 1. Surveying setting out tools and equipment      1. Tape measure      2. Measuring wheel      3. Total station      4. Automatic level   2. Setting out works      1. Building setting out      2. Paths setting out      3. Vehicular parking   3. Setting out works documented | * Practical Assessment * Project * Third-Party Report * Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Recommended Resources for 25 Trainees | | | | | | | |
| **S/No.** | **Category/Item** | | **Description/ Specifications** | **Quantity** | | | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | | | | |
| **B** | **Learning Facilities & Infrastructure** | | | | | | |
|  | Whiteboards | | For trainer’s use | 1 pc | | | 1:25 |
|  | computers with the following software:  Windows/Linux/Macintosh Operating System  Microsoft Office Software  Google Workspace Account  Antivirus Software | | For both trainer’s and trainees’ use | 25 | | | 1:1 |
|  | Printers | | For both trainer’s and trainee’s use | 2 | | | 1:13 |
|  | External storage media | | For both trainer’s and trainee’s use | 1 | | | 1:1 |
|  | Projector | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Smartboard/Smart TV | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Chalkboard | | For trainer’s use | 1 pc | | | 1:25 |
|  | Internet connection | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Instruction Room | | 9m by 8m | 1 | | | 1:25 |
| **C** | **Consumable materials** | | | | | | |
|  | Assorted colour of whiteboard markers | | For trainee’s use | 10 pcs | | | 10:1 |
|  | Printing Papers | | For trainee’s use | Reams | | | 5:1 |
|  | Rolls Flip Charts | | For both trainer’s and trainees’ use | 5 pcs | | | 1:5 |
| **D** | **Tools and Equipment** | | | | | | |
|  | Tape measure | For both trainer’s and trainees’ use | | | 25 pcs | 1:1 | |
|  | Measuring wheel | For both trainer’s and trainees’ use | | | 25 pcs | 1:1 | |
|  | Total station | For both trainer’s and trainees’ use | | | 1 pcs | 1:25 | |
|  | Automatic level | For both trainer’s and trainees’ use | | | 2 pcs | 1:13 | |
|  | Dumpy level | For both trainer’s and trainees’ use | | | 2 pcs | 1:13 | |
|  | Levelling staff | For both trainer’s and trainees’ use | | | 4 pcs | 1:7 | |
|  | Ranging rods | For both trainer’s and trainees’ use | | | 15 pcs | 1:2 | |
|  | tripod stand | For both trainer’s and trainees’ use | | | 3 pcs | 1:8 | |
|  | pegs | For both trainer’s and trainees’ use | | | 50 pcs | 2:1 | |
|  | Mattocks | For both trainer’s and trainees’ use | | | 13 pcs | 1:2 | |
|  | Spade | For both trainer’s and trainees’ use | | | 13 pcs | 1:2 | |
|  | Hoe | For both trainer’s and trainees’ use | | | 13 pcs | 1:2 | |
|  | Jembe | For both trainer’s and trainees’ use | | | 13 pcs | 1:2 | |
|  | Panga | For both trainer’s and trainees’ use | | | 13 pcs | 1:2 | |
|  | Wheelbarrows | For both trainer’s and trainees’ use | | | 13 pcs | 1:2 | |

# 

# MODULE 4

## ARCHITECTURAL INTERIORS DESIGN

**UNIT CODE: 0732 551 13A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Design Architectural Interiors**

Duration of Unit: **180 hours**

**Unit Description**

This unit covers the competencies an Architectural technician requires to design architectural interiors. It includes; Preparing architectural interior design drawings, preparing architectural interior fittings schedule, preparing architectural interior material schedule, and inspecting architectural interior works design conformance

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOMES | DURATION(HRS) |
|  | Prepare architectural interior design drawings | 50 |
|  | Prepare architectural interior fittings schedule | 50 |
|  | Prepare an architectural interior material schedule | 40 |
|  | Inspect architectural interior works design conformance. | 40 |
| **TOTAL** | | **180** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare architectural interior design drawings | * 1. Client interior design requirements documentation.      1. Aesthetic Preference.         1. Styles         2. Colours         3. Materials      2. Functional needs         1. Purpose         2. Activities      3. Budget         1. Prioritization         2. Overall budget         3. Flexibility      4. Timeline         1. Desired completion date         2. Flexibility   2. Furniture layout drawing preparation.      1. Elements of Furniture Layout Drawing         1. Room dimension         2. Existing features         3. Furniture placement         4. Traffic flow         5. scale   3. Interior perspective drawings preparation.      1. Types of perspectives.         1. One point         2. Two-point         3. Three-point      2. Elements of Interior Perspective Drawings         1. Lighting         2. Materials         3. Colours         4. Finishing         5. Décor | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Prepare architectural interior fittings schedule | 2.1 Interior Fittings and fixtures quantifying.   * + 1. Lighting     2. Paint     3. Floor finishes     4. Cladding     5. Ceiling     6. Furniture   1. Interior fittings and fixtures sizes specifying.      1. Lighting      2. Paint      3. Floor finishes      4. Cladding      5. Ceiling      6. Furniture   2. Fitting and fixtures specifying.      1. Kitchen fittings      2. Sanitary fittings      3. Lighting fixtures      4. Doors and cabinets | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Prepare an architectural interior material schedule | * 1. Spatial conceptualization.      1. Elements of Space Conceptualization         1. Circulation         2. Proportion         3. Scale         4. Hierarchy         5. Unity   2. Materials coverage area quantifying.      1. Measurements      2. Material quantities      3. Wastage factor      4. Unit sizes      5. Material list   3. Materials specification.      1. Elements of Material Specification         1. Material type         2. Quality         3. Dimensions         4. Colour         5. Performance requirement         6. Testing and Inspection         7. Source | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Inspect architectural interior works design conformance. | * 1. Interior works concept conformance check.  1. Areas of check for conformance 2. Design intent 3. Functionality 4. Quality 5. Budget 6. Timeline    1. Interior works material conformance check. 7. Areas of check for conformance    * 1. Material type      2. Quality      3. Dimensions      4. Colour      5. Finish      6. Compliance with Standards    1. Interior works quality standards check.       1. Areas to check          1. Workmanship          2. Aesthetics          3. Functionality          4. Safety          5. Compliance with specification | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Architectural Interior design reference books | For trainee’s use | 5 No. | 1:5 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instruction room | 9m by 8m | 1 No | 1:25 |
| **C** | **Consumable materials** | | | |
|  | 5 reams of A2 drawing paper | For trainee’s use | 5 reams | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |
|  | Printer | For trainee’s use | 1 pcs | 1:25 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | Camera | For trainee’s use | 2 pcs | 1:13 |
|  | Laser distance measure | For trainee’s use | 25 pcs | 1:1 |

## STRUCTURAL ANALYSIS PRINCIPLES

**UNIT CODE: 0732 551 14A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply Structural Analysis Principles**

Duration of Unit: **180 hours.**

**Unit Description**

This unit covers the principles required by an architectural technician in applying structural analysis principles. These principles include applying principles on; shear force and bending moment structural analysis, beam and frames structural analysis and construction structural design.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Apply shear force and bending moments structural analysis principles | 60 |
|  | Apply beam and frame structural analysis principles | 60 |
|  | Apply construction structural design principles | 60 |
| **TOTAL** | | **180** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply shear force and bending moments structural analysis principles | * 1. Types of supports applied.      1. Types of loading         1. Point load         2. Uniformly distributed loading         3. Varying loading      2. Types of supports         1. Simply supported         2. Fixed support         3. Simply supported         4. Hinged support         5. Roller support   2. Support reaction on beams and frames calculation.   3. Shear force and bending moment drawings preparation.      1. Shear force diagram      2. Bending moment diagram      3. Point of contraflexure | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply beam and frame structural analysis principles | * 1. Forces on beams application.   2. Forces on beams and frames calculation.      1. Method of section      2. Method of joint      3. Moment area method   3. Force moment drawings preparation. | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply construction structural design principles | * 1. Types of stress identification.      1. Combined stress      2. Bending stress      3. Shear stress   2. Compression stresses calculation.      1. Structural elements characteristics         1. Strength         2. Stiffness         3. Durability         4. Elasticity         5. Fire resistance      2. Structural elements         1. Beams         2. Columns         3. Foundations         4. Slabs         5. Walls         6. Roof trusses         7. Bracing systems   3. Nature of compression members.      1. –(ve) or +(ve) | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Recommended Resources for 25 Trainees | | | | | | | |
| **S/No.** | **Category/Item** | | **Description/ Specifications** | **Quantity** | | | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | | | | |
| **B** | **Learning Facilities & infrastructure** | | | | | | |
|  | Whiteboards | | For trainer’s use | 1 pc | | | 1:25 |
|  | computers with the following software:  Windows/Linux/Macintosh Operating System  Microsoft Office Software  Google Workspace Account  Antivirus Software | | For both trainer’s and trainee’s use | 25 | | | 1:1 |
|  | Printers | | For both trainer’s and trainee’s use | 2 | | | 1:13 |
|  | External storage media | | For both trainer’s and trainee’s use | 1 | | | 1:1 |
|  | Projector | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Smartboard/Smart TV | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Chalkboard | | For trainer’s use | 1 pc | | | 1:25 |
|  | Internet connection | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Instruction Room | | 9m by 8m | 1 | | | 1:25 |
| **C** | **Consumable materials** | | | | | | |
|  | Assorted colour of whiteboard markers | | For trainee’s use | 10 pcs | | | 10:1 |
|  | Printing Papers | | For trainee’s use | Reams | | | 5:1 |
|  | graph paper | | For trainee’s use | Reams | | | 1:5 |
|  | Rolls Flip Charts | | For both trainer’s and trainee’s use | 5 pcs | | | 1:5 |
| **D** | **Tools and Equipment** | | | | | | |
|  | 30cm ruler | For both trainer’s and trainee’s use | | | 25 pcs | 1:1 | |
|  | Scientific Calculator | For both trainer’s and trainee’s use | | | 25 pcs | 1:1 | |

## CONSTRUCTION MATERIALS PRINCIPLES

**UNIT CODE: 0722 551 15A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply Construction Materials Principles**

**Duration of Unit:**  120 hours

**Unit Description**

This unit covers the principles required by an architectural technician in applying construction materials. These principles include applying construction walling units, construction timber and timber products, construction clay products, construction metal products, construction plastics and Rubber products, construction paints and varnishes, construction glass, and construction concrete.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **LEARNING OUTCOME** | **DURATION(HRS)** |
|  | Apply construction walling units | 8 |
|  | Apply construction timber and timber products | 8 |
|  | Apply construction clay products. | 8 |
|  | Apply construction metal products. | 8 |
|  | Apply construction plastics and Rubber products. | 8 |
|  | Apply construction paints | 8 |
|  | Apply construction glass | 8 |
|  | Apply construction concrete | 8 |
| **TOTAL** | | **120** |

#### 

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply construction walling units | * 1. Construction walling materials identification.   2. Construction walling materials assembling.      1. Building stones      2. Concrete blocks      3. Soil stabilized blocks      4. EPS      5. Prefabricate walling units   3. Walling construction.      1. Properties of walls.         1. Texture         2. Colour         3. Density         4. Strength         5. Fire resistance         6. Sound insulation      2. Types of walling         1. Masonry wall         2. Concrete wall         3. Prefabricated wall | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Apply construction timber and timber products | * 1. Construction timber products identification.      1. Plywood      2. Block boards      3. Soft board      4. Beams      5. Post and Poles      6. Lumber   2. Construction timber products assembling.      1. Plywood      2. Block boards      3. Soft board      4. Beams      5. Post and Poles      6. Lumber   3. Construction timber products preparation.      1. Timber conversion.         1. Quarter sawing         2. Through and through         3. Radial         4. Tangential      2. Seasoning of timber method.         1. Natural.         2. Artificial   4. Timber building elements construction.      1. Wooden staircase      2. Wooden decking      3. Wooden beams and joists      4. Wooden doors and windows.      5. Wood claddings etc | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply construction clay products. | * 1. Construction clay products identification.      1. Bricks      2. Roofing tiles      3. Window sills      4. Adobe      5. Terra cotta   2. Clay products assembling.      1. Bricks      2. Roofing tiles      3. Window sills      4. Adobe      5. Terra cotta   3. Clay products fixing | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Apply construction metal products. | * 1. Construction metal products identification.      1. Aluminium      2. Steel      3. Iron      4. Copper      5. Brass   2. Metal products assembling      1. Aluminum      2. Steel      3. Iron      4. Copper      5. Brass   3. Metal products fixing.      1. Properties of metal.         1. Texture         2. Color         3. Density         4. Strength         5. Fire resistance         6. Sound insulation      2. Fixing methods         1. Welding         2. Soldering         3. Brazing         4. Riveting         5. Bolting and screwing         6. Adhesives | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Apply construction plastics and Rubber products. | * 1. Plastics and Rubber products identification.      1. Thermoplastics      2. Thermosetting   2. Plastics and Rubber products assembling.      1. Thermoplastics      2. Thermosetting      3. Properties of plastics and rubber         1. Durability         2. Lightweight         3. Chemical resistance         4. Density         5. Strength         6. Fire resistance         7. Sound insulation   3. Plastics and rubber products fixing.      1. Types of products.         1. PVC pipes         2. Polythene sheeting         3. Acrylic sheets         4. Rubber roofing materials         5. Rubber expansion joints      2. Methods of fixing         1. Adhesives         2. Screwing | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply construction paints | * 1. Paints product identification.      1. Oil-based paints      2. Water-based paints      3. Special effects paints      4. Varnishes   2. Paints products assembling.      1. Oil-based paints      2. Special effects paints      3. Water-based paints      4. Varnishes   3. Paints application.      1. Properties of paints.      2. Paints defects, causes, and remedy.         1. Blistering         2. Flaking         3. Chalking         4. Alligatoring         5. Efflorescence etc      3. Methods of paint application         1. Brush application         2. Spray application         3. Roller application         4. Steel float application | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply construction glass | * 1. Construction glass product identification.      1. Float glass      2. Tinted glass      3. Fire-resistance glass      4. Acoustic glass      5. Smart glass      6. Low emissivity glass      7. Insulated glass units      8. Laminated glass      9. Tempered glass   2. Construction glass products assembling.   3. Glass elements fixing      1. Types and uses of glass         1. Float glass         2. Tinted glass         3. Fire-resistance glass         4. Acoustic glass         5. Smart glass         6. Low emissivity glass         7. Insulated glass units         8. Laminated glass         9. Tempered glass      2. Properties of glass         1. Brittleness         2. Strength         3. Durability         4. Fire resistance         5. Water resistance         6. Thermal conductivity         7. Acoustic properties | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply construction concrete | * 1. Construction concrete product identification.      1. Concrete blocks      2. Concrete slabs      3. Concrete tiles      4. Concrete pipes   2. Construction concrete products assembling   3. Concrete products installation.      1. Transportation      2. Lifting and positioning      3. Connections      4. Grouting      5. Finishing. | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Construction materials reference books | For trainee’s use | 14 | 1:2 |
|  | Calculators | For trainee’s use | 25 | 1:1 |
| **B** | **Learning Facilities & infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instructions room | 9m by 8m | 1 | 1:25 |
| **C** | **Consumable materials** | | | |
|  | lime | For trainee’s use | 10 bags 50kg | 1:2 |
|  | Oil paint | For trainee’s use | 50 liters | 2:1 |
|  | water paint | For trainee’s use | 50 liters | 2:1 |
|  | varnish | For trainee’s use | 50 liters | 2:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For both trainer’s and trainees’ use | 25 | 1:1 |
|  | Trowel | For both trainer’s and trainees’ use | 25 | 1:1 |
|  | Float | For both trainer’s and trainees’ use | 25 | 1:1 |
|  | Plumb bob | For both trainer’s and trainees’ use | 25 | 1:1 |
|  | Builders square | For trainee’s use | 25 | 1:1 |
|  | Spirit level | For trainee’s use | 25 | 1:1 |
|  | Sand sieves | For trainee’s use | 2 | 1:13 |
|  | Mattocks | For trainee’s use | 13 | 1:2 |
|  | Spade | For trainee’s use | 13 | 1:2 |
|  | Hoe | For trainee’s use | 13 | 1:2 |
|  | Jembe | For trainee’s use | 13 | 1:2 |
|  | Panga | For trainee’s use | 13 | 1:2 |
|  | Wheelbarrows | For trainee’s use | 5 | 1:5 |
|  | Turpentine | For trainee’s use | 25 litres | 1:1 |
|  | putty | For trainee’s use | 100kgs | 4:1 |
|  | glass sheet | For trainee’s use | 100 m2 | 4:1 |
|  | ballast | For trainee’s use | 5 tonnes | 1:5 |
|  | sand | For trainee’s use | 5 tons | 1:5 |
|  | masonry stones | For trainee’s use | 500 | 20:1 |
|  | concrete blocks | For trainee’s use | 500 | 20:1 |
|  | bricks | For trainee’s use | 200 | 8:1 |
|  | Timber sections | For trainee’s use | 8’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 6’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 4’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 3’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 2’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 2’x2’long 100 m | 4:1 |

# MODULE 5

## CONSTRUCTION PROJECT MANAGEMENT

**UNIT CODE: 0731 551 16A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Manage Construction Project**

Duration of Unit: **150 hours**

**Unit Description**

This unit covers the competencies an Architectural technician requires to manage a construction project. It includes; Organizing a construction site, managing the site construction team, procuring building materials, Supervising the construction process, implementing site safety measures, and Preparing project progress reports

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **LEARNING OUTCOMES** | **DURATION(HRS)** |
|  | Organise construction site | 25 |
|  | Manage site construction team | 25 |
|  | Procure building materials. | 25 |
|  | Supervise the construction process | 25 |
|  | Implement site safety measures | 25 |
|  | Prepare project progress report | 25 |
| **TOTAL** | | **150** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Organise construction site | * 1. Site hoarding erection.      1. Types of hoarding         1. Timber hoarding         2. Steel hoarding         3. Mesh hoarding   2. Site activities designation      1. Preconstruction activities         1. Excavations         2. Backfilling         3. Site clearing         4. Installations         5. Landscaping         6. Site survey and investigation.         7. Permit acquisition         8. Procurement of materials and equipment         9. Mobilization of resources      2. Site preparation and excavations.         1. Clearing and grading         2. Site layout and levelling         3. Excavation for foundation and utilities      3. Foundation construction         1. Foundation excavation         2. Formwork construction         3. Reinforcement placement         4. Concrete pouring and curing      4. Structural construction         1. Masonry work         2. Roof Construction         3. Erection of steel   3. Site utilities installation      1. Considerations for site utility installation.         1. Safety         2. Quality of workmanship         3. Compliance with regulations         4. Cost         5. Activities coordination | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Manage site construction team | 2.1Team members recruitment.   * + 1. Construction team members        1. Client        2. Architect        3. Quantity surveyor        4. Structural engineer        5. Contractor        6. Supplier        7. Operatives        8. Clerk of Works     2. Factors to consider in team recruitment        1. Experience and Qualification        2. Skills and abilities        3. Attitude and work ethics        4. Cultural fit        5. Availability and Commitment        6. Cost and budget.   1. Tasks assignment to team members      1. Tasks assignment process         1. Tasks identification         2. Task prioritisation         3. Tasks matching         4. Consider availability         5. Communicate the assignment         6. Monitor progress and give support         7. Address challenges         8. Provide feedback and recognition   2. Project site workers' records keeping      1. Types of records         1. Daily construction report         2. Quality Control Report         3. Change order request         4. Invoices         5. Materials delivery receipt   3. Project teams are guided to deliver specific works as per the work   4. Remuneration schedules preparation. | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Procure building materials. | * 1. Building materials identification      1. Steel sections      2. Aggregates      3. Finishes      4. Concrete      5. Fittings      6. Stones      7. Timber   2. Building material samples acquiring.      1. Steel sections      2. Aggregates      3. Finishes      4. Concrete      5. Fittings      6. Stones      7. Timber   3. Building Materials Inspection      1. Material verification      2. Physical testing      3. Chemical testing      4. Visual inspection      5. Documentation | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Supervise the construction process | * 1. Construction activities identification.      1. Excavations      2. Backfilling      3. Site clearing      4. Installations      5. Landscaping   2. Construction tasks execution.   3. Construction activities approvals request. | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Implement site safety measures | 5.1Personal protective equipment donning   * 1. Safety signs erection.      1. Warning signs      2. Prohibition sign      3. Mandatory signs      4. Informatory signs   2. Hazardous areas enclosure.      1. Safety cones      2. Safety tape | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Prepare project progress report | * 1. Project progress data collection.      1. Project milestones      2. Task completion      3. Recourse utilization      4. Budget tracking      5. Risk assessment      6. Issues and challenge      7. Stakeholders feedback   2. Project progress report preparation.      1. Components of project progress report         1. Executive summary         2. Project Overview         3. Progress against the plan         4. Key achievement         5. Financial status         6. Stakeholder communication   3. Project progress report presentation.      1. Components of a Project Presentation         1. Introduction         2. Current status         3. Achievement and results         4. Financial performance | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Construction project management reference books | For trainee’s use | 5 No. | 1:5 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instruction room | 9m by 8m | 1 No | 1:25 |
| **C** | **Consumable materials** | | | |
|  | 5 reams of A2 drawing paper | For trainee’s use | 5 reams | 1:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |
|  | Printer | For trainee’s use | 1 pcs | 1:25 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | Camera | For trainee’s use | 2 pcs | 1:13 |
|  | Laser distance measure | For trainee’s use | 25 pcs | 1:1 |

# BUILDING CONSTRUCTION TECHNOLOGY PRINCIPLES

**UNIT CODE: 0731 551 17A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply History of Architecture Concepts**

Duration of Unit: **210 hours**

**Unit Description**

This unit covers the principles required by an architectural technician when applying construction technology principles. These principles include applying principles on; construction site preliminary work, construction substructure work, construction superstructure work, construction finishes work, and construction external work

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Apply construction site preliminary work principles | 40 |
|  | Apply construction substructure work principles | 50 |
|  | Apply Construction superstructure work principles | 40 |
|  | Apply construction finishes work principles | 40 |
|  | Apply construction external work principles | 40 |
| **TOTAL** | | **210** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply construction site preliminary work principles | * 1. Site investigation      1. Site reconnaissance      2. Geotechnical investigation      3. Environmental assessment      4. Utility investigation   2. Site clearance      1. Vegetation removal      2. Demolition of existing structures      3. Debris clearance      4. Utility relocation   3. Site soil testing.      1. Reasons for soil testing         1. Foundation design         2. Excavation planning         3. Material selection         4. Environmental Compliance      2. Soil testing methods         1. Boring         2. Soil sampling         3. Soil classification         4. Laboratory testing            1. Particle size analysis            2. Atterberg limits            3. Moisture content            4. Permeability test            5. Compaction test            6. Shear strength test | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Apply construction substructure work principles | * 1. Site levelling   2. Setting out   3. Foundation types      1. Strip foundation      2. Stepped foundation      3. Pad foundation      4. Pile foundation   4. Ground floor installation.      1. Concrete slab      2. Timber floors      3. Beam and block floors      4. Raised access floor      5. Hollow port slab      6. Raft slab | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply Construction superstructure work principles | * 1. Building walling types      1. Load-bearing walls      2. Non load bearing walls      3. Curtain walls   2. Building openings installation.      1. Doors      2. Windows      3. arches   3. Building concreting works      1. Batching         1. Weight         2. Volume      2. Mixing         1. Manual         2. Mechanical      3. Placing      4. Compacting      5. Curing   4. Concreting areas      1. Foundation strip      2. Beams      3. Slabs      4. Columns      5. Retaining walls   5. Roof construction elements      1. Timber element sections      2. Steel sections      3. Roofing covering      4. Roofing materials      5. Framing      6. Insulation      7. Ventilation      8. flashing | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Apply construction finishes work principles | * 1. Construction walling finishes      1. Plastering      2. Rendering      3. Tiling      4. Painting      5. Cladding   2. Construction floor finishes      1. Screed      2. Tilling      3. Epoxy   3. Roof coverings and finishes installation.      1. Coverings         1. GCI sheets         2. Clay tiles         3. Wood shingles         4. Slate         5. Synthetic finishes         6. Green roofs      2. Finishes         1. Fascia         2. Ceiling         3. Eaves |  |
| 1. Apply construction external work principles | * 1. Construction drainage works      1. Surface drains      2. Subsurface drains      3. Culverts      4. Grading and sloping      5. French drains      6. Inspection chamber      7. Biodigester      8. Septic tank      9. Cesspool   2. Vehicular parking construction      1. Parking spaces      2. Types of parking      3. Driveways and entrances      4. Signage and markings      5. Lighting      6. Kerbs and wheel stops      7. Pedestrian walkways      8. Bicycles parking   3. Fences construction      1. Types of fences         1. Picket fence         2. Ha-ha fence         3. Lattice fence etc      2. Fence construction members         1. Fencing panels         2. Support posts         3. Base plates         4. Bracings         5. Gates and access points |  |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Construction materials reference books | For trainee’s use | 14 | 1:2 |
|  | Calculators | For trainee’s use | 25 | 1:1 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instructions room | 9m by 8m | 1 | 1:25 |
| **C** | **Consumable materials** | | | |
|  | lime | For trainee’s use | 10 bags 50kg | 1:2 |
|  | Oil paint | For trainee’s use | 100 liters | 4:1 |
|  | water paint | For trainee’s use | 100 liters | 4:1 |
|  | varnish | For trainee’s use | 100 liters | 4:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For both trainer’s and trainee’s use | 25 | 1:1 |
|  | Trowel | For both trainer’s and trainee’s use | 25 | 1:1 |
|  | Float | For both trainer’s and trainee’s use | 25 | 1:1 |
|  | Plumb bob | For both trainer’s and trainee’s use | 25 | 1:1 |
|  | Builders square | For trainee’s use | 25 | 1:1 |
|  | Spirit level | For trainee’s use | 25 | 1:1 |
|  | Sand sieves | For trainee’s use | 2 | 1:13 |
|  | Mattocks | For trainee’s use | 13 | 1:2 |
|  | Spade | For trainee’s use | 13 | 1:2 |
|  | Hoe | For trainee’s use | 13 | 1:2 |
|  | Jembe | For trainee’s use | 13 | 1:2 |
|  | Panga | For trainee’s use | 13 | 1:2 |
|  | Wheelbarrows | For trainee’s use | 5 | 1:5 |
|  | Turpentine | For trainee’s use | 50liters | 2:1 |
|  | putty | For trainee’s use | 100kgs | 4:1 |
|  | glass sheet | For trainee’s use | 100 m2 | 4:1 |
|  | ballast | For trainee’s use | 5 tonnes | 1:5 |
|  | sand | For trainee’s use | 5 tonnes | 1:5 |
|  | masonry stones | For trainee’s use | 500 | 20:1 |
|  | concrete blocks | For trainee’s use | 500 | 20:1 |
|  | bricks | For trainee’s use | 200 | 8:1 |
|  | Timber sections | For trainee’s use | 8’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 6’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 4’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 3’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 2’x1’long 100 m | 4:1 |
|  | Timber sections | For trainee’s use | 2’x2’long 100 m | 4:1 |

# MODULE 6

## ENTREPRENEURIAL SKILLS

**UNIT CODE: 0413 541 18A**

**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**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOMES | DURATION(HRS) |
|  | Apply financial literacy | 6 |
|  | Apply the entrepreneurial concept | 4 |
|  | Identify entrepreneurship opportunities | 6 |
|  | Apply business legal aspects | 6 |
|  | Innovate Business Strategies | 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 | 1. Observation 2. Project 3. Written assessment 4. Oral assessment 5. Third party report 6. Interviews |
| 1. 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 | * Observation * Project * Written assessment * Oral assessment * Third party report |
| 1. Identify entrepreneurship opportunities | * 1. Sources of business ideas   2. Factors to consider when evaluating business opportunity   3. Business life cycle | * Observation * Project * Written assessment * Oral assessment * Third party report |
| 1. 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 | * Observation * Project * Written assessment * Oral assessment * Third party report |
| 1. Innovate business Strategies | * 1. Creativity in business   2. Innovative business strategies   3. Entrepreneurial Linkages   4. ICT in business growth and development | * Observation * Project * Written assessment * Oral assessment * Third party report |
| 1. Develop Business Plan | * 1. Business description   2. Marketing plan   3. Organizational/Management plan   4. Production/operation plan   5. Financial plan   6. Executive summary   7. Business plan presentation   8. Business idea incubation | * Observation * Written assessment * Project * Oral assessment * Third party report |

**Suggested Delivery Methods**

* Project (Business plan)
* Case studies
* Field trips
* Group Discussions
* Demonstration
* Question and answer
* Problem solving
* Experiential
* Team training
* Guest speakers

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/**  **Specifications** | **Quantity** | **Recommended**  **Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** |  |  |  |
|  | Textbooks | The Lean Startup by Eric Ries.  Zero to One by Peter Thiel  Start with Why by Simon Sinek | 10 pcs  10 pcs  10 pcs | 1:2.5  1:2.5  1:2.5 |
| **B** | **Learning Facilities & infrastructure** |  |  |  |
|  | Lecture/theory room | 60m2 | 1 | 1:25 |
|  | Computer workshop | 160 m2 | 1 | 1:25 |
|  | Computers | Operating System: 64-bit Windows 11 or 10 version 1809 or above  Processor: 2.5 GHz (3+ GHz recommended),  Memory: 8 GB (32GB recommended)  Disk space: 10 GB  Display: 1920 x 1080 resolution  Display Card: 2 GB GPU (8 GB recommended) and DirectX 11 compliant (DirectX 12 recommended) | 25 pcs | 1:1 |
|  | Projector | high-resolution projectors with HDMI input | 1 | 1:25 |
|  | Smartboard/Smart TV | Specifications: 77-inch interactive whiteboard with touch and pen functionality. | 1 | 1:25 |
|  | Whiteboard | Traditional whiteboard | 1 | 1:25 |
|  | Printers | With Print, Copy, Scan and Fax | 2 | 1:12.5 |
| **C** | **Software** |  |  |  |
|  | Operating systems | Windows/Linux/Macintosh Operating System | Installed in 25 computers | 1:1 |
|  | Web Browsers | Chrome, Firefox, Edge, Safari | Installed in 25 computers | 1:1 |
|  | Software for business planning | Live Plan, Bizplan | Installed in 25 computers | 1:1 |
|  | Market research tools | Google Trends or SurveyMonkey or Statista | Installed in 25 computers | 1:1 |
|  | Marketing platforms | Google Ads or Hootsuite | Installed in 25 computers | 1:1 |
|  | Graphic design software | Adobe creative cloud or canvas | Installed in 25 computers | 1:1 |
| **D** | **Consumables** |  |  |  |
|  | Pens, pencils, rulers and paper | Whiteboard markers, 2H pencils, plastic rulers, A2 white papers | Enough |  |
|  | Printing papers | A4 and A3 | Enough |  |

# BUILDING WORKS MEASUREMENT PRINCIPLES

**UNIT CODE: 0731 551 19A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Apply Building Works Measurements Principles**

**Duration of Unit: 180 hours**

**Unit Description**

This unit covers the principles required by an architectural technician in applying building works measurement principles. These principles include applying substructure works taking off principles, applying superstructure works taking off principles applying construction external work taking off principles and applying building works estimating and costing principles.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOME | DURATION(HRS) |
|  | Apply substructure works taking off principles | 50 |
|  | Apply superstructure works taking off principles. | 40 |
|  | Apply construction external work taking off principles | 40 |
|  | Apply building works estimating and costing principles | 50 |
| **TOTAL** | | **180** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply substructure works taking off principles | * 1. Substructure elements documentation.      1. trench excavation      2. reducing level      3. Blinding      4. Damp-proof membrane      5. Reinforcement bars      6. BRC mesh      7. Damp proof course      8. foundation strip      9. foundation walling      10. hard core fill      11. floor bed   2. Substructure elements quantification.      1. trench excavation      2. reducing level      3. Blinding      4. Damp-proof membrane      5. Reinforcement bars      6. BRC mesh      7. Damp proof course      8. foundation strip      9. foundation walling      10. hard core fill      11. floor bed   3. Substructure elements booking.      1. trench excavation      2. reducing level      3. Blinding      4. Damp-proof membrane      5. Reinforcement bars      6. BRC mesh      7. Damp proof course      8. foundation strip      9. foundation walling      10. hard core fill      11. floor bed | * Practical Assessment * Project * Third-Party Report * Written tests |
| 1. Apply superstructure works taking off principles. | * 1. Superstructure elements documentation.      1. Walling units      2. Doors      3. Windows      4. Roof work      5. Fittings and fixtures      6. Finishes   2. Superstructure elements quantification.      1. Walling units      2. Doors      3. Windows      4. Roof work      5. Fittings and fixtures      6. Finishes   3. Superstructure elements quantities booking.      1. Walling units      2. Doors      3. Windows      4. Roof work      5. Fittings and fixtures      6. Finishes | 1. Practical Assessment 2. Project 3. Third-Party Report 4. Written tests |
| 1. Apply construction external work taking off principles | * 1. External works elements documentation.      1. Landscaping works         1. Vehicular parking         2. Kerbs         3. Paving blocks         4. Cabro      2. Rendering works      3. Drainage works         1. Manholes         2. Inspection chambers         3. Soak pits         4. Septic tanks         5. Biodigester   2. External works elements quantification.      1. Vehicular parking      2. Kerbs      3. Paving blocks      4. Cabro      5. Manholes      6. Inspection chambers      7. Soak pits      8. Septic tanks      9. Biodigester   3. External works elements quantities booking.      1. Vehicular parking      2. Kerbs      3. Paving blocks      4. Cabro      5. Manholes      6. Inspection chambers      7. Soak pits      8. Septic tanks      9. Biodigester | * Practical Assessment * Project * Third Party Report * Written tests |
| 1. Apply building works estimating and costing principles | * 1. Construction preliminary work unit rate build-up.      1. Access roads      2. Site clearance      3. Demolition work   2. Substructure work unit rate build-up.      1. Excavation works      2. Walling works      3. Concreting works      4. Hard-core fill      5. Blinding   3. Superstructure work unit rate build-up.      1. Superstructure walling      2. Doors and windows      3. Roofing      4. Finishes   4. External work unit rate build-up.      1. Landscaping works      2. Drainage works      3. Paving works   5. Bill of quantities preparation.      1. Squaring      2. Abstracting      3. Billing | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Recommended Resources for 25 Trainees | | | | | | | |
| **S/No.** | **Category/Item** | | **Description/ Specifications** | **Quantity** | | | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | | | | |
| **B** | **Learning Facilities & Infrastructure** | | | | | | |
|  | Whiteboards | | For trainer’s use | 1 pc | | | 1:25 |
|  | computers with the following software:  Windows/Linux/Macintosh Operating System  Microsoft Office Software  Google Workspace Account  Antivirus Software | | For both trainer’s and trainees’ use | 25 | | | 1:1 |
|  | Printers | | For both trainer’s and trainee’s use | 2 | | | 1:13 |
|  | External storage media | | For both trainer’s and trainee’s use | 1 | | | 1:1 |
|  | Projector | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Smartboard/Smart TV | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Chalkboard | | For trainer’s use | 1 pc | | | 1:25 |
|  | Internet connection | | For both trainer’s and trainee’s use | 1 | | | 1:25 |
|  | Instruction Room | | 9m by 8m | 1 | | | 1:25 |
| **C** | **Consumable materials** | | | | | | |
|  | Assorted colour of whiteboard markers | | For trainee’s use | 10 pcs | | | 10:1 |
|  | Printing Papers | | For trainee’s use | Reams | | | 5:1 |
|  | Rolls Flip Charts | | For both trainer’s and trainee’s use | 5 pcs | | | 1:5 |
|  | Dimension paper | | For both trainer’s and trainee’s use | 5 pcs | | | 1:5 |
| **D** | **Tools and Equipment** | | | | | | |
|  | Tape measure | For both trainer’s and trainee’s use | | | 25 pcs | 1:1 | |
|  | Scientific Calculator | For both trainer’s and trainee’s use | | | 25 pcs | 1:1 | |

## ARCHITECTURAL PROJECT DESIGN

**UNIT CODE: 0732 551 20A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Design Architectural Project**

Duration of Unit: **250 hours**

**Unit Description**

This unit covers the competencies required by an Architectural technician to design an architectural project. It includes; preparing an architectural project brief, conducting an architectural site analysis, carrying out an architectural project literature review, conducting an architectural project case study, conducting an architectural project activity study and producing architectural project design drawings.

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| S.NO | LEARNING OUTCOMES | DURATION(HRS) |
|  | Prepare architectural project brief. | 40 |
|  | Conduct architectural site analysis. | 40 |
|  | Carry out an architectural project literature review. | 40 |
|  | Conduct an architectural project case study. | 40 |
|  | Conduct an architectural project activity study. | 40 |
|  | Produce architectural project design drawings. | 50 |
| **TOTAL** | | **250** |

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare architectural project brief. | * 1. Documentation of architectural client requirements.      1. Site size      2. Location      3. Spatial requirements         1. Furniture requirement         2. Space requirement   2. Project cost and estimates documentation.   1.2.1 Clients budget   * 1. Regulatory requirements documentation.      1. Land use      2. NEMA requirements      3. Ownership         1. Leasehold         2. Freehold         3. Government | * Practical Assessment * Project * Third Party Report * Written tests |
| 1. Conduct architectural site analysis. | * 1. Site analysis tools and equipment assembling.      1. Measuring tape      2. Leaser distance measuring tool      3. Core cutter      4. Camera      5. Safety gear   2. Notebook/sketch pad      1. Site Data Collection.      2. Access and Size      3. Soil data      4. Solar direction      5. Wind direction      6. Services      7. Vegetation      8. Topography      9. Scenery      10. Neighbourhood   3. Site analysis.      1. Access and Size      2. Soil data      3. Solar direction      4. Wind direction      5. Services      6. Vegetation      7. Topography      8. Scenery      9. Neighbourhood   4. Site analysis documentation.      1. Prepare rendered expressions.         1. Access and size         2. Soil data         3. Solar direction         4. Wind direction         5. Services         6. Vegetation         7. Topography         8. Scenery         9. Neighbourhood | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Carry out an architectural project literature review. | * 1. Architectural project historical background analysis.      1. Desktop study   Architectural Technological and Innovation Parameters Documentation.   * + 1. Digital design and fabrication     2. Sustainable design   1. Architectural project material use documentation.      1. Materials specifications      2. Name      3. Manufacture      4. Physical properties      5. Certification.      6. Quantities      7. Location   2. Architectural project design parameters documentation.      1. Access      2. Utility spaces      3. Spatial relationship      4. Aesthetics      5. Noise control      6. Thermal insulation      7. Climatic factors      8. Cultural forces      9. Social forces      10. Material selection      11. Design Concept      12. Services requirements      13. Zoning regulations          1. Plot ratio          2. Coverage ratio          3. Parking | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Conduct an architectural project case study. | * 1. Case study analysis tools and equipment assembling      1. Measuring tape      2. Leaser distance measuring tool      3. Core cutter      4. Camera      5. Safety gear      6. Notebook/sketch pad   2. Analysis of Case Study Parameters      1. Access      2. Utility spaces      3. Spatial relationship      4. Aesthetics      5. Noise control      6. Thermal insulation      7. Climatic factors      8. Cultural forces      9. Social forces      10. Material selection      11. Design Concept      12. Services requirements      13. Zoning regulations          1. Plot ratio          2. Coverage ratio          3. Parking   3. Case study analysis drawings preparation. | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Conduct an architectural project activity study. | * 1. Spatial ergonomics carried out.      1. Anthropometric and Ergonomics Analysis         1. Desk and Chair Analysis         2. Lighting and ventilation         3. Spatial design   2. Spatial activity study.      1. Furniture requirement      2. Furniture use analysis   3. Activity study schedule preparation.      1. Schedule components.         1. Space         2. Number of persons         3. Furniture/fittings area (M2)         4. Number of rooms         5. Total area required | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |
| 1. Produce architectural project design drawings. | * 1. Architectural project drawing tools and equipment assembling.      1. Computer/ laptop      2. Printer/plotter      3. Tape measure      4. Notebooks      5. Camera      6. Laser distance measure      7. Safety gear   2. Architectural project drawing preparation.      1. Schematic drawing      2. Sketch models      3. Presentation drawings      4. Detail drawings      5. Substructure details      6. Superstructure details      7. External work details   3. Perspectives      1. Interior      2. Exterior   4. Architectural Drawing Generation.      1. Working drawing         1. Floor plans         2. Elevations         3. Sections         4. Foundation layout         5. Roof plan         6. Site plan   5. Location Plan   6. Schedules      1. Door Schedule      2. Window Schedule      3. Finishes Schedule | 1. Practical Assessment 2. Project 3. Third Party Report 4. Written tests |

**Suggested Methods of Instruction**

* Practicals
* Projects
* Demonstration
* Group Discussion
* Direct Instruction

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/ Specifications** | **Quantity** | **Recommended Ratio**  (Item: Trainee) |
| **A** | **Learning Materials** | | | |
|  | Architectural design reference books | For trainee’s use | 5 No. | 1:5 |
|  | NT cuter | For trainer’s use | 25 pcs | 1:1 |
|  | Scaled Trees | For trainee’s use | 250 pcs | 10:1 |
|  | Human scale figures | For trainee’s use | 250 pcs | 1:1 |
|  | Scaled vehicle models | For trainee’s use | 250 pcs | 10.1 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Whiteboards | For trainer’s use | 1 pc | 1:25 |
|  | Chalkboard | For trainer’s use | 1 pc | 1:25 |
|  | Instruction room | 9m by 8m | 1 No | 1:25 |
|  | Studio room | 9m x 8m | 1 No | 1:25 |
| **C** | **Consumable materials** | | | |
|  | 5 reams of A2 drawing paper | For trainee’s use | 5 reams | 1:1 |
|  | 25 packets of colored pencil | For trainee’s use | 25 pkts | 1:1 |
|  | 25 packets of watercolors | For trainee’s use | 25 pkts | 1:1 |
|  | 25 packets of B pencil series | For trainee’s use | 25 pkts | 1:1 |
|  | 10 reams of watercolor papers | For trainee’s use | 10 reams | 1:13 |
|  | 2 reams of transparencies | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of embossed papers | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of mounting boards | For trainee’s use | 2 reams | 1:13 |
|  | 2 reams of forex boards | For trainee’s use | 2 reams | 1:13 |
|  | Adhesives | For trainee’s use | 50 pcs | 2 :1 |
|  | Rolls Flip Charts | For both trainer’s and trainee’s use | 5 pcs | 1:5 |
|  | 100 m grass mart roll | For trainee’s use | 100 m | 4:1 |
| **D** | **Tools and Equipment** | | | |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |
|  | Printer | For trainee’s use | 1 pcs | 1:25 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | Camera | For trainee’s use | 2 pcs | 1:13 |
|  | Laser distance measure | For trainee’s use | 25 pcs | 1:1 |
|  | Tape measure | For trainee’s use | 25 pcs | 1:1 |
|  | scientific calculators | For trainee’s use | 25 pcs | 1:1 |
|  | Computer/ laptop | For trainee’s use | 25 pcs | 1:1 |

## 