TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

NATIONAL COMPETENCY BASED CURRICULUM

FOR

ICT TECHNICIAN

LEVEL 6

TVET CDACC
P.O BOX 15745-00100
NAIROBI

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FOREWORD

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya's development blueprint, Vision 2030 and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution of Kenya 2010 and this resulted to the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). A key feature of this policy is the radical change in the design and delivery of the 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 mode of delivery allows 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 these Occupational Standards were developed for the purpose of developing a competency-based curriculum for ICT Technician. These Occupational Standards will also be the bases for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a great role towards development of competent human resource for the ICT sector's growth and development.

PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION

PREFACE

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

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET in order to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with ICT Sector Skills Advisory Committee (SSAC have developed these Occupational Standards for ICT technicians. These standards will be the bases for development of competency-based curriculum for ICT technician Level 6.

The occupational standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide.

I am grateful to the Council Members, Council Secretariat, ICT SSAC, expert workers and all those who participated in the development of these Occupational Standards.

Prof. CHARLES M. M. ONDIEKI, PhD, FIET (K), Con. EngTech.
CHAIRMAN, TVET CDACC

ACKNOWLEDGMENT

These Occupational Standards were developed through combined effort of various stakeholders from private and public organizations. I am thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided inputs towards the development of these Standards.

I thank TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) for providing guidance on the development of these Standards. My gratitude goes to Automotive Sector Skills Advisory Committee (SSAC) members for their contribution to the development of these Standards. I thank all the individuals and organizations who participated in the validation of these Standards.

I acknowledge all other institutions which in one way or another contributed to the development of these Standards.

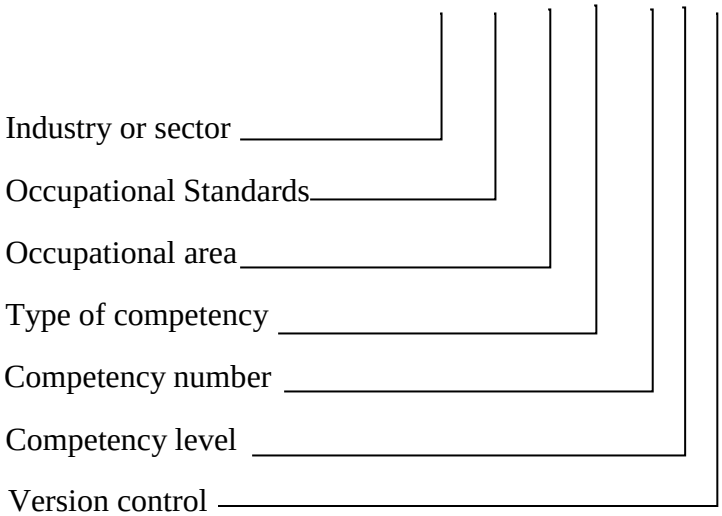
Dr. LAWRENCE GUANTAI M'ITONGA, PhD
COUNCIL SECRETARY/CEO

ACRONYMS

CAD	Computer Aided Design
CCTV	Closed Circuit Television
CDACC	Curriculum Development, Assessment and Certification Council
DMA	Direct Memory Access
DTP	Desktop Publishing
DSS	Decision Support System
EMS	Environmental Management Systems
ERP	Enterprise Resource Planning
FIFO	First In First Out
HSE	Health, safety and environment
HTTP	Hypertext Transfer Protocol
ICT	Information Communication Technology
IS	Information system
ISP	Information security policy
KCSE	Kenya Certificate of Secondary Education
KNQA	Kenya National Qualification Authority
KNQF	Kenya National Qualification Framework
LAN	Local Area Network
MIS	Management Information System
OSH	Occupational Health and Safety
PAN	Personal Area Network
POST	Power on Self-Test
PPE	Personal Protective Equipment
RAM	Random Access Memory
SDLC	System Development life cycle
SSFT	Shortest Seek Time First
TVET	Technical and Vocational Education and Training
WAN	Wide Area Network

KEY TO UNIT CODE

IT/CU/ICT/BC/01/6 A



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COURSE OVERVIEW

1.DESCRIPTION OF THE COURSE

This course is designed to equip individuals with the competences required to practice as ICT technicians in the modern Kenyan Technological sector. It reflects the employers' demand for qualified personnel, that would enable them to compete in an environment where the technology is constantly evolving, and the expectations of clients are becoming ever more demanding.

The course consists of:

- Basic units of learning to build the necessary skills and attitudes to enhance the employability of ICT technicians, enabling them to make positive contributions to the quickly growing technology Country;

- Core units of learning to develop high-end knowledge and skills to perform any Information communication and technological services needed in the society.

2. Units of Learning

Basic Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factor
IT/CU/ICT/BC/1/6	Communication Skills	40	4
IT/CU/ICT/BC/2/6	Numeracy Skills	60	6
IT/CU/ICT/BC/3/6	Digital Literacy	60	6
IT/CU/ICT/BC/4/6	Entrepreneurial Skills	100	10
IT/CU/ICT/BC/5/6	Employability Skills	80	8
IT/CU/ICT/BC/6/6	Environmental Literacy	40	4
IT/CU/ICT/BC/7/6	Occupational Safety and Health Practices	40	4
Total		**420**	**42**

Common Unit of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factor
IT/CU/ICT/CC/1/6	Apply Basic Electronics	**100**	**10**

Core Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit Factor
ICT/CU/IT/CR/1/6	Perform computer Networking	180	18
ICT/CU/IT/CR/2/6	Install computer software	150	15
ICT/CU/IT/CR/3/6	Control ICT Security threats	200	20
ICT/CU/IT/CR/4/6	Provide ICT System Support	100	10
ICT/CU/IT/CR/5/6	Perform Website Design	200	20
ICT/CU/IT/CR/6/6	Perform computer repair and maintenance	100	10
ICT/CU/IT/CR/7/6	Manage Database Systems	250	25
ICT/CU/IT/CR/8/6	Perform Management Information System	150	15
ICT/CU/IT/CR/9/6	Perform Graphic Design	200	20
ICT/CU/IT/CR/10/6	Develop Computer Program	300	30
ICT/CU/IT/CR/11/6	Develop Mobile Application	350	35
ICT/CU/IT/CR/12/6	Perform System Analysis and Design	150	15
	Industrial Attachment	480	48
Total		**2660**	**266**
Gross total		**3180**	**318**

3. Entry Requirements

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

a) Kenya Certificate of Secondary Education (K.C.S.E.) with a minimum mean grade of C- (C minus)
Or
b) ICT Technician Level 5 certificate with **one** year of continuous work experience
Or

c) Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

4. Provision for Industrial attachment

It is envisaged that the trainee will have undergone an industrial training and assessment with a recognised ICT institution as a prerequisite for completion of this training course.

5. Assessment

The course will be assessed at two levels: internally and externally. Internal assessment is continuous and is conducted by the trainer who is monitored by an internal accredited verifier while external assessment is the responsibility of TVET CDACC.

As part of the continuous internal assessment process, trainees will maintain a portfolio of evidence of their achievements.

6. Certification

On successful completion of a Unit of Learning, a trainee will be issued with a Certificate that acknowledges the achievement of that competence. On successful completion of **all** units of learning, a trainee will be awarded an ICT Diploma qualification. These certificates will be issued by TVET CDACC in conjunction with training provider.

BASIC UNITS OF LEARNING

COMMUNICATION SKILLS

UNIT CODE: IT/CU/ICT/BC/1/6

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate communication skills

Duration of Unit: 40 hours

Unit Description
This unit covers the competencies required in meeting communication needs of clients and colleagues and developing, establishing, maintaining communication pathways and strategies. It also covers competencies for conducting interview, facilitating group discussion and representing the organization in various forums.

Summary of Learning Outcomes

1. Utilize specialized communication skills processes
2. Develop communication strategies
3. Establish and maintain communication pathways
4. Promote use of communication strategies
5. Conduct interview
6. Facilitate group discussion
7. Represent the organization

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Utilize specialized communication skills processes	• Communication process • Modes of communication • Medium of communication • Effective communication • Barriers to communication • Flow of communication • Sources of information • Organizational policies • Organization requirements for written and electronic communication methods • Report writing • Effective questioning techniques	• Written • Oral

	(clarifying and probing) • Workplace etiquette • Ethical work practices in handling communication • Active listening • Feedback • Interpretation • Flexibility in communication • Types of communication strategies • Elements of communication strategy	
2. Develop communication strategies	• Dynamics of groups • Styles of group leadership • Openness and flexibility in communication • Communication skills relevant to client groups	• Observation • Written
3. Establish and maintain communication pathways	• Types of communication pathways	• Written • Observation
4. Promote use of communication strategies	• Application of elements of communication strategies • Effective communication techniques	• Written • Observation
5. Conduct interview	• Types of interview • Establishing rapport • Facilitating resolution of issues • Developing action plans	• Written • Observation
6. Facilitate group discussion	• Identification of communication needs • Dynamics of groups • Styles of group leadership • Presentation of information • Encouraging group members participation • Evaluating group communication strategies	• Written • Observation

7. Represent the organization	• Presentation techniques • Development of a presentation • Multi-media utilization in presentation • Communication skills relevant to client groups	• Observation • Written

Suggested Delivery Methods

- Interview
- Role playing
- Observation

Recommended Resources

- Desktop computers/laptops
- Internet connection
- Projectors
- Telephone

NUMERACY SKILLS

UNIT CODE: IT/CU/ICT/BC/2/6

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate numeracy skills

Duration of Unit: 60 hours

Unit Description

This unit describes the competencies required by a worker in order to apply a wide range of mathematical calculations for work; apply ratios, rates and proportions to solve problems; estimate, measure and calculate measurement for work; Use detailed maps to plan travel routes for work; Use geometry to draw and construct 2D and 3D shapes for work; Collect, organize and interpret statistical data; Use routine formula and algebraic expressions for work and use common functions of a scientific calculator.

Summary of Learning Outcomes

1. Apply a wide range of mathematical calculations for work
2. Apply ratios, rates and proportions to solve problems
3. Estimate, measure and calculate measurement for work
4. Use detailed maps to plan travel routes for work
5. Use geometry to draw and construct 2D and 3D shapes for work
6. Collect, organize and interpret statistical data
7. Use routine formula and algebraic expressions for work
8. Use common functions of a scientific calculator

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply a wide range of mathematical calculations for work	❑ Fundamentals of mathematics ▪ Addition, subtraction, multiplication and division of positive and negative numbers ▪ Algebraic expressions manipulation ❑ Forms of fractions, decimals and percentages ❑ Expression of numbers as powers and roots	❑ Written tests ❑ Assignments ❑ Supervised exercises
2. Apply ratios, rates	❑ Rates, ratios and proportions	❑ Written tests

	and proportions to solve problems	❑ Meaning ❑ Conversions into percentages ❑ Direct and inverse proportions determination ❑ Performing calculations ❑ Construction of graphs, charts and tables ❑ Recording of information	❑ Oral questioning ❑ Assignments ❑ Supervised exercises
3.	Estimate, measure and calculate measurement for work	❑ Units of measurements and their symbols ❑ Identification and selection of measuring equipment ❑ Conversion of units of measurement ❑ Perimeters of regular figures ❑ Areas of regular figures ❑ Volumes of regular figures ❑ Carrying out measurements ❑ Recording of information	❑ Assignments ❑ Supervised exercises ❑ Written tests
4.	Use detailed maps to plan travel routes for work	❑ Identification of features in routine maps and plans ❑ Symbols and keys used in routine maps and plans ❑ Identification and interpretation of orientation of map to North ❑ Demonstrate understanding of direction and location ❑ Apply simple scale to estimate length of objects, or distance to location or object ❑ Give and receive directions using both formal and informal language ❑ Planning of routes ❑ Calculation of distance, speed and time	❑ Oral ❑ Written ❑ Practical test ❑ Observation
5.	Use geometry to draw and construct 2D and 3D shapes for	❑ Identify two dimensional shapes and routine three dimensional shapes in everyday objects and in	❑ Oral ❑ Written ❑ Practical test

work	different orientations ❑ Explain the use and application of shapes ❑ Use formal and informal mathematical language and symbols to describe and compare the features of two dimensional shapes and routine three dimensional shapes ❑ Identify common angles ❑ Estimate common angles in everyday objects ❑ Evaluation of unknown angles ❑ Use formal and informal mathematical language to describe and compare common angles ❑ Symmetry and similarity ❑ Use common geometric instruments to draw two dimensional shapes ❑ Construct routine three dimensional objects from given nets	❑ Observation
6. Collect, organize and interpret statistical data	❑ Classification of data ▪ Grouped data ▪ Ungrouped data ❑ Data collection ▪ Observation ▪ Recording ❑ Distinguishing between sampling and census ❑ Importance of sampling ❑ Errors in sampling ❑ Types of sampling and their limitations e.g. ▪ Stratified random ▪ Cluster ▪ Judgmental ❑ Tabulation of data	❑ Assignments ❑ Supervised exercises ❑ Written tests

	▪ Class intervals ▪ Class boundaries ▪ Frequency tables ▪ Cumulative frequency ❑ Diagrammatic and graphical presentation of data e.g. ▪ Histograms ▪ Frequency polygons ▪ Bar charts ▪ Pie charts ▪ Cumulative frequency curves ❑ Interpretation of data	
7. Use routine formula and algebraic expressions for work	❑ Solving linear equations ❑ Linear graphs ▪ Plotting ▪ Interpretation ❑ Applications of linear graphs ❑ Curves of first and second degree ▪ Plotting ▪ Interpretation	❑ Assignments ❑ Supervised exercises ❑ Written tests
8. Use common functions of a scientific calculator	❑ Identify and use keys for common functions on a calculator ❑ Calculate using whole numbers, money and routine decimals and percentages ❑ Calculate with routine fractions and percentages ❑ Apply order of operations to solve multi-step calculations ❑ Interpret display and record result	❑ Oral ❑ Written ❑ Practical test ❑ Observation

Suggested Delivery Methods

- Group discussions
- Demonstration by trainer
- Practical work by trainee
- Exercises

Recommended Resources

- Calculators
- Rulers, pencils, erasers
- Charts with presentations of data
- Graph books
- Dice
- Internet

DIGITAL LITERACY

UNIT CODE:IT/CU/ICT/BC/3/6

Relationship to Occupational Standards
This unit addresses the Unit of Competency: Demonstrate digital literacy

Duration of Unit: 60 hours

Unit Description
This unit describes competencies required to use a computer and other digital devices for the purposes of communication, work performance and management at the workplace.

Summary of Learning Outcomes
1. Identify computer software and hardware
2. Apply security measures to data, hardware, software in automated environment
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace
5. Apply desktop publishing in official assignments
6. Prepare presentation packages

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	• Concepts of ICT • Functions of ICT • History of computers • Components of a computer • Classification of computers	• Written tests • Oral presentation • Observation
2. Apply security measures to data, hardware and software	• Data security and control • Security threats and control measures • Types of computer crimes • Detection and protection against computer crimes • Laws governing protection of ICT	• Written tests • Oral presentation • Observation • Project
3. Apply computer software in solving tasks	• Operating system • Word processing • Spread sheets	• Oral questioning • Observation • Project

	• Data base design and manipulation • Data manipulation, storage and retrieval	
4. Apply internet and email in communication at workplace	• Computer networks • Network configurations • Uses of internet • Electronic mail (e-mail) concept	• Oral questioning • Observation • Oral presentation • Written report
5. Apply desktop publishing in official assignments	• Concept of desktop publishing • Opening publication window • Identifying different tools and tool bars • Determining page layout • Opening, saving and closing files • Drawing various shapes using DTP • Using colour pellets to enhance a document • Inserting text frames • Importing and exporting text • Object linking and embedding • Designing of various publications • Printing of various publications	• Oral questioning • Observation • Oral presentation • Written report • Project
6. Prepare presentation packages	• Types of presentation packages • Procedure of creating slides • Formatting slides • Presentation of slides • Procedure for editing objects	• Oral questioning • Observation • Oral presentation • Written report • Project

Suggested Delivery Methods

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Project
- Group discussions

Recommended Resources

- Desk top computers
- Laptop computers
- Other digital devices
- Printers
- Storage devices
- Internet access
- Computer software

ENTREPRENEURIAL SKILLS

UNIT CODE: IT/CU/ICT/BC/4/6

Relationship to occupational standards

This unit addresses the unit of competency: Demonstrate entrepreneurial skills

Duration of unit: 100 hours

Unit description

This unit describes the competencies critical to demonstration of entrepreneurial aptitudes. It involves, developing business innovation strategies, developing new markets, customer base, expanding employed capital and undertaking regional/county expansion while retaining motivated staff.

Summary of Learning Outcomes

1. Develop business innovation strategies
2. Develop new products/ markets
3. Expand customers and product lines
4. Motivate all staff/workers
5. Expand employed capital base
6. Undertake regional/county business expansion

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Develop business Innovation strategies	• Innovation in business • Business innovation strategies • Creativity for business development • New technologies in entrepreneurship • Linkages with other entrepreneurs • Setting strategic directions • New ideas and approaches • Entrepreneurial skills development • Market trends	❑ Observation ❑ Case studies ❑ Individual/group assignments ❑ projects ❑ Written ❑ Oral

	• Monitoring and anticipating market trends • Products and processes in entrepreneurship • Business conventions ad exhibitions • Business growth refocus	
2. Develop new products/ markets	• Feasibility study for new products • Identifying new sources of raw material and resources • New target markets/customers • Increasing products and services • Marketing improvement • Intrapreneurship and business growth	❑ Observation ❑ Case studies ❑ Individual/group assignments ❑ projects ❑ Written ❑ Oral
3. Expand customers and product lines	• Market demand • Regulatory environment • Creating product and services competitive advantages • Creating royal client base • Identifying and maintain new customers and markets • Advance product/ service promotions • Advance market expansion • Small business records management • Book keeping and auditing for small businesses • Computer application software and programmes • ICT in customer and product diversification	❑ Oral ❑ Observation ❑ Case studies ❑ Individual/group assignments ❑ projects ❑ Written
4. Motivate staff/workers	• Motivation of workers • Communication at workplace for motivation purpose • Problem solving	❑ Observation ❑ Case studies ❑ Individual/group assignments ❑ projects

	• Conflict resolution at place of work • Good staff/workers relation • Team building and team work • Staff development and enhancement • Culture of continuous improvement	❑ Written
5. Expand employed capital base	• Employed capital in business • Business share holdings • Types of shares • Shares diversification • Role of shareholders • Entrepreneurship • Increasing products and services	❑ Observation ❑ Case studies ❑ Individual/group assignments ❑ projects ❑ Written ❑ Oral
6. Undertake county/ regional business expansion	• Region/ county identification process • Regional/ county laws and regulation • Business regional/county expansion • Regional/ County business expansion • Innovation in business • Business expansion and diversification • Resources for regional/county expansion • Small business Strategic Plan • Computer software in business development • ICT and business growth	❑ Observation ❑ Case studies ❑ Individual/group assignments ❑ projects ❑ Written ❑ Oral

Suggested Delivery Methods

- Instructor led facilitation of theory
- Demonstration by trainer
- Practice by trainee
- Role play
- Case study

Recommended Resources

- Case studies for small businesses
- Business plan templates
- Laptop/ desktop computers
- Internet
- Telephone
- Writing materials

EMPLOYABILITY SKILLS

UNIT CODE: IT/CU/ICT/BC/5/6

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate employability skills

Duration of Unit: 80 hours

Unit Description

This unit covers competencies required to demonstrate employability skills. It involves competencies for exuding self-awareness and ability to deal with everyday life challenges; demonstrating critical safe work habits and leading a workplace team; planning and organizing work activities; applying learning, creativity and innovativeness in workplace functions; pursuing professional growth and managing time effectively in the workplace.

Summary of Learning Outcomes

1. Develop self-awareness and ability to deal with life challenges
2. Demonstrate critical safe work habits for employees
3. Lead a workplace team
4. Plan and organize work
5. Maintain professional growth and development in the workplace.
6. Demonstrate learning, creativity and innovativeness in the workplace.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Develop self-awareness and ability to deal with life challenges	• Self-awareness • Formulating personal vision, mission and goals • Strategies for overcoming life challenges • Managing emotions • Emotional intelligence • Asserting one-self • Assertiveness versus aggressiveness	• Observation • Written • Oral interview • Third party report

	• Expressing personal thoughts, feelings and beliefs • Self esteem • Developing and maintaining high self-esteem • Developing and maintaining positive self-image • Sharing personal feelings • Setting performance targets • Monitoring and evaluating performance • Articulating ideas and aspirations • Accountability and responsibility	
2. Demonstrate critical safe work habits for employees	• Stress and stress management • Time concept • Punctuality and time consciousness • Leisure • Integrating personal objectives into organizational objectives • Resources mobilization • Resources utilization • Setting work priorities • Developing healthy relationships • HIV and AIDS • Drug and substance abuse • Dealing with emerging issues	• Observation • Written • Oral interview • Third party report
3. Lead a workplace team	• Leadership • Influence • Team building • Determination of team roles and objectives • Team parameters and relationships • Individual responsibilities in a team • Forms of communication • Business communication • Complementing team activities • Gender and gender mainstreaming • Human rights protocols	• Observation • Oral interview • Written • Third party report

	• Developing healthy relationships • Maintaining relationships • Conflicts and conflict resolution	
4. Plan and organize work	• Planning • Organizing • Schedules of activities • Developing work plans • Developing work goals/objectives and deliverables • Monitoring work activities • Evaluating work activities • Resource mobilization • Resource allocation • Resource utilization • Decision making • Problem solving • Negotiation	• Observation • Oral interview • Written • Third party report
5. Maintain professional growth and development in the workplace	• Avenues for professional growth • Training and career opportunities • Assessing training needs • Mobilizing training resources • Licenses and certifications for professional growth and development • Pursuing personal and organizational goals • Managing work priorities and commitments • Recognizing career advancement	• Observation • Oral interview • Written • Third party report
6. Demonstrate learning, creativity and innovativeness in the workplace	• Managing own learning • Mentoring • Coaching • Networking • Variety of learning context • Application of learning • Safe use of technology • Taking initiative/proactivity • Flexibility	• Observation • Oral interview • Written • Third party report

	• Identifying opportunities • Generating new ideas • Workplace innovation • Performance improvement	

Suggested Methods of Delivery

- Instructor lead facilitation of theory
- Demonstrations
- Simulation/Role play
- Group Discussion
- Presentations
- Projects
- Case studies
- Assignments

Recommended Resources

- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors

ENVIRONMENTAL LITERACY

UNIT CODE: **IT/CU/ICT/BC/6/6**

Relationship to Occupational Standards:

This unit addresses the unit standard: **Demonstrate environmental literacy**

Duration of Unit: 40 hours

Unit Description

This unit describes the competencies required to control environmental hazard, control environmental pollution, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, identify environmental legislations/conventions for environmental concerns, implement specific environmental programs, monitor activities on environmental protection/programs, analyze resource use and develop resource conservation plans.

Summary of Learning Outcomes

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use
4. Evaluate current practices in relation to resource usage
5. Identify Environmental legislations/conventions for environmental concerns
6. Implement specific environmental programs
7. Monitor activities on Environmental protection/Programs
8. Analyze resource use
9. Develop resource conservation plans

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Control environmental hazard	• Purposes and content of Environmental Management and Coordination Act 1999 • Storage methods for environmentally hazardous materials • Disposal methods of hazardous	• Written questions • Oral questions • Observation of work procedures

	wastes • Types and uses of PPE in line with environmental regulations • Occupational Safety and Health Standards (OSHS)	
2. Control environmental Pollution control	• Types of pollution • Environmental pollution control measures • Types of solid wastes • Procedures for solid waste management • Different types of noise pollution • Methods for minimizing noise pollution	• Written questions • Oral questions • Observation of work procedures • Role play
3. Demonstrate sustainable resource use	• Types of resources • Techniques in measuring current usage of resources • Calculating current usage of resources • Methods for minimizing wastage • Waste management procedures • Principles of 3Rs (Reduce, Reuse, Recycle) • Methods for economizing or reducing resource consumption	• Written questions • Oral questions • Observation of work procedures • Role play
4. Evaluate current practices in relation to resource usage	• Collection of information on environmental and resource efficiency systems and procedures, • Measurement and recording of current resource usage • Analysis and recording of current purchasing strategies. • Analysis of current work processes to access information and data • Identification of areas for improvement	• Written questions • Oral questions • Observation of work procedures • Role play

5. Identify Environmental legislations/conventions for environmental concerns	• Environmental issues/concerns • Environmental legislations /conventions and local ordinances • Industrial standard /environmental practices • International Environmental Protocols (Montreal, Kyoto) • Features of an environmental strategy	• Written questions • Oral questions • Observation of work procedures
6. Implement specific environmental programs	• Community needs and expectations • Resource availability • 5s of good housekeeping • Identification of programs/Activities • Setting of individual roles /responsibilities • Resolving problems /constraints encountered • Consultation with stakeholders	• Written questions • Oral questions • Observation of work procedures • Role play
7. Monitor activities on Environmental protection/Programs	• Periodic monitoring and Evaluation of activities • Gathering feedback from stakeholders • Analysing data gathered • Documentation of recommendations and submission • Setting of management support systems to sustain and enhance the program • Monitoring and reporting of environmental incidents to concerned /proper authorities	• Oral questions • Written tests • Practical test • Observation
8. Analyze resource use	• Identification of resource consuming processes • Determination of quantity and nature of resource consumed • Analysis of resource flow	• Written tests • Oral questions • Practical test • Observation

	through different parts of the process. • Classification of wastes for possible source of resources.	
9. Develop resource Conservation plans	• Determination of efficiency of use/conversion of resources • Causes of low efficiency of use of resources • Plans for increasing the efficiency of resource use	• Written tests • Oral questions • Practical test • Observation

Suggested Delivery Methods

- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainees
- Observations and comments and corrections by trainers

Recommended Resources

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Environmental Management and Coordination Act 1999
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE)
- ISO standards
- Company environmental management systems (EMS)
- Montreal Protocol
- Kyoto Protocol

OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE:IT/CU/ICT/BC/7/6

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate occupational safety and health practices

Duration of Unit: 40 hours

Unit Description
This unit describes the competencies required to comply with regulatory and organizational requirements for occupational safety and health.

Summary of Learning Outcomes
1. Identify workplace hazards and risk
2. Identify and implement appropriate control measures to hazards and risks
3. Implement OSH programs, procedures and policies/guidelines

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify workplace hazards and risks	• Identification of hazards in the workplace and/or the indicators of their presence • Evaluation and/or work environment measurements of OSH hazards/risk existing in the workplace • Gathering of OSH issues and/or concerns	• Oral questions • Written tests • Observation of trainees identify hazards and risks
2. Identify and implement appropriate control measure to hazards and risks	• Prevention and control measures e.g. use of PPE • Contingency measures	• Oral questions • Written tests • Practical tests • Observation of implementation of control measures
3. Implement OSH programs, procedures and policies/guidelines	• Company OSH program, procedures and policies/guidelines • Implementation of OSH procedures and policies/ guidelines	• Oral questions • Written tests • Practical test • Observation

	• Training of team members and advice on OSH standards and procedures • Implementation of procedures for maintaining OSH-related records	

Suggested Delivery Methods

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos

Recommended Resources

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE) e.g.
    - Mask
    - Face mask/shield
    - Safety boots
    - Safety harness
    - Arm/Hand guard, gloves
    - Eye protection (goggles, shield)
    - Hearing protection (ear muffs, ear plugs)
    - Hair Net/cap/bonnet
    - Hard hat
    - Face protection (mask, shield)
    - Apron/Gown/coverall/jump suit
    - Anti-static suits
    - High-visibility reflective vest

COMMON UNIT OF COMPETENCY

APPLY BASIC ELECTRONICS

UNIT CODE:IT/CU/ICT/CC/1/6

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstration of basic electronic skills

Duration of Unit: 100 Hours

Unit description

This unit specifies the competencies required to demonstrate basic skills of electronics. It involves identification of electric circuits, electronic components, understand semi-conductor theory, identify and classify memories, apply number systems and identify emerging trends in electronics.

Summary of Learning Outcomes

1. Identify electric circuits
2. Identify Electronic components
3. Understand Semi-conductor theory
4. Identify and classify memory
5. Apply Number Systems
6. Emerging trends in Electronics

Learning outcomes	Content	Suggested Assessment Methods
1. Identify electrical circuits	❑ Definition of electrical circuit. ❑ Basic electrical quantities and their units ✓ E.m.f in volts ✓ Current in Amperes ✓ Power in watts ✓ Energy in joules ✓ Resistance in ohms ❑ Types of electrical circuits ✓ Simple a.c circuits ✓ Simple d.c circuits	• Practical exercises • Written • Observation • Oral
2. Identify Electronic components	❑ Identification of electronic components ✓ Resistor ✓ Capacitor ✓ Diode ✓ Inductor ❑ Characteristic of electronic components. ❑ Application of electronic components.	• Practical exercises • Written • Observation • Oral

	❑ Identification of integrated circuit characteristics	
3. Understand Semi-conductor theory	❑ Definition of semiconductor and related terms ✓ Atom ✓ Atomic structure ❑ Description of the structure of matter ✓ ❑ Explanation of electrons in conductors and semiconductors ❑ Types of semiconductors materials ✓ Silicon ✓ germanium ❑ Explanation of P-type and N-types materials ✓ P-type ✓ N-type ❑ Description of P-N junction diodes operations ✓ Forward biasing ✓ Reverse biasing ❑ Operations of transistors ✓ PNP type ✓ NPN type	• Practical exercises • Written • Observation • Oral
4. Identify and classify memory	❑ Definition of memory ❑ Classification of memories ✓ RAM ✓ ROM ✓ DAM ❑ Types of memories ✓ Semiconductor memories ✓ Magnetic memories	• Written • Observation • Oral
5. Apply Number Systems and binary coding	❑ Definition of number system and binary code ❑ Types of number systems ✓ Decimal ✓ Binary ✓ Octal ✓ Hexadecimal	• Written • Observation • Oral

	❑ Base conversion ❑ Binary arithmetic ✓ Addition ✓ Subtraction ✓ Multiplication ✓ Division ❑ Binary codes ✓ 8421 BCD ✓ Excess-3 ❑ Represent decimal numbers in BCD ❑ BCD arithmetic ✓ Addition ✓ Subtraction ✓ Multiplication ✓ Division	
6. Emerging trends in Electronics	❑ Description of emerging trends ❑ Explanation of challenges of emerging trends ❑ Coping with the emerging trends	• Written • Observation • Oral

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools
1. Screw Drivers 2. Pliers 3. Wire cutters 4. Wire Strippers 5. Clamps 6. Vises

Equipment

- Voltmeter
- Ohmmeter
- Ammeter
- Multimeter
- Power supplies
- LCR meter

Materials and supplies

- Circuits
- Semiconductor materials
- Conductors e.g. copper, gold, silver
- Insulators e.g. rubber, glass, mica

CORE UNITS OF LEARNING

NETWORKING

UNIT CODE: IT/CU/ICT/CR/1/6

Relationship to Occupational Standards
This unit addresses the unit of competency: **Performing Computer Networking**

Duration of Unit:180hours

Unit description
This unit specifies the competencies required to perform computer Networking. It involves Identification of network types and Components, Connection of networking devices, configuration of network devices, network testing, configuration of network types, perform network security, monitor network connectivity and maintain network.

Summary of Learning Outcomes

1. Identify network type and components
2. Connection network devices
3. Configuration of network devices
4. Network testing
5. Configuration of Network types
6. Perform Network security
7. Monitor Network connectivity and performance
8. Maintain Network

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify network type and components	❑ Definition of Network ❑ Definition of network terms ❑ Network topologies ✓ Star ✓ Ring ✓ Mesh ✓ Hybrid ✓ Point to Point ❑ Network types ✓ WAN	• Practical exercises • Observation • Oral

	✓ LAN ✓ PAN ✓ MAN ❑ Components of a network ✓ switches/hubs ✓ routers ✓ ports ✓ media ✓ computers ❑ Categories of computer network ✓ peer ✓ client server	
2. Connect network devices	❑ Definition of network devices ❑ Identification of Network connection Media ✓ Wired ✓ Wireless ❑ Characteristics of connection medium ❑ Network devices ✓ switches/hubs ✓ routers ✓ ports ✓ computers ❑ connect network devices	• • Practical • Observation • Written • Oral • Practical
3 Configure network devices	❑ Definition of configuration ❑ Network Architecture ✓ OSI ✓ TCP/IP Protocol Suite ✓ Ethernet ❑ Network protocols ✓ TCP/IP ✓ UDP ✓ HTTP ✓ FTP ✓ DCIP	• Practical • Oral • Observation • Written

	✓ DHCP ❑ Network Operating system ❑ Connect and configure network devices	
4 Perform Network testing .	❑ Outline network test plan ❑ Network testing tools • Clamp meter • Voltmeter • Cable tester • Signal tester ❑ Test network components ❑ Test the network ❑ Test report	• Practical exercises with observation checklists conducted by trainer. • Oral questioning with checklist conducted by trainer to assess underpinning knowledge. • Short tests to assess underpinning knowledge. • Learner to perform project
5 Configure network types e.g. LAN, WAN	❑ Determine appropriate Network type ❑ Types of Network types ❑ Assemble prerequisite components and medium ❑ Network Components Configuration procedures ❑ Network protocols Configuration procedures	• Practical • Oral • Observation • Written
6 Perform Network Security	❑ Definition of network security ❑ Network threats ✓ Internal ✓ External ❑ Prevention measures • Firewalls • User accounts	• Practical • Observations

	control • Security policies • Anti-viruses • Encryption ❑ Enforce network security measures ❑ Network Security Policy	
7 Monitor Network connectivity and Performance	❑ Monitoring tools and software ✓ Ping ✓ Tracert ✓ NSLookup ✓ Ipconfig ✓ Speed test	• Practical exercises with observation checklists conducted by trainer. • Oral questioning with checklist conducted by trainer to assess. Underpinning knowledge.
8 Maintain Network	❑ Maintenance schedule plan ❑ maintenance tools ✓ Console ✓ Wireshark ✓ Nmap ✓ ❑ corrective/preventive measures	• Practical • Oral • Observation • Written

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools

1. Network tool kit
2. Signal testers
3. Spam Blacklists
4. URL Encode
5. Header checker
6. LanTEK III cable certifier
7. Crimpers (RJ45, Hex Coax)
8. Punch Down Tools.
9. Wire Strippers & Cutters.
10. Network Testers.
11. Tone & Probes.
12. Cable Installation Tools.
13. Coaxial & RG6 Tools.

Equipment

- Computer
- Cables
- Switches
- Routers/modem
- Bridges
- Repeaters
- Fibre modules
- Antistatic gloves
- Ports
- RJ45
- NIC
- Gateways
- Microwave dishes

Materials and supplies

Consumables for maintaining Network including:

- RJ45
- Fibre Modules

- Cables

Replacement parts including:

- Points
- Switches
- Routers
- NIC
- Modem
- Cables

Cleaning materials;

Hand cleaner.

Reference materials

Manufacturers service manuals for Network equipment

SOFTWARE INSTALLATION

UNIT CODE: IT/CU/ICT/CR/2/6

Relationship to Occupational Standards
This unit addresses the unit of competency: Installation of Computer Software

Duration of Unit: 150 hours

Unit Description:
This unit describes the competencies required in Installing computer software. It involves Identification of software to be installed, installation of the software, configuration of the software, software testing, user training and software maintenance.

Summary of Learning Outcomes:

1. Identify software to be installed
2. Install the software
3. Configure the software
4. Test software functionality
5. Perform user training
6. Perform Software Maintenance

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identification of software to be installed	❑ Definition of software ❑ Classification of software ✓ System ✓ Application ❑ Criteria for selection ❑ Operating systems ❑ Types of operating systems ✓ Single and multi-user ✓ Single and multitasking ✓ Real time ✓ Distributed	• Practical • Oral questioning • Written test

	✓ Batch ❑ Functions of operating systems ✓ Device management ✓ Memory management ✓ Storage management ✓ Process control ✓ Security Management ❑ Types of operating system interfaces ✓ Command-line/character user ✓ Menu driven ✓ Graphical user Interface	
2. Install the software	❑ Define software installation ❑ Acquisition of software ❑ Installation media ❑ Software installation legal requirements ❑ Existing data protection ❑ Types of software installation ✓ Attended ✓ Unattended ✓ Headless ✓ Schedule/Automated ✓ Clean/Updating ✓ Network ❑ Software and installation and registration ❑ Software configuration ❑ Importance of registration	• Practical • Observation • Written tests • Writing reports
3. Software configuration management	❑ Software configuration components ✓ software configuration identification ✓ software configuration control ✓ software configuration status accounting and auditing ❑ Reasons for software configuration ✓ Tracking ✓ Controlling ❑ Importance of software configuration management	• Practical • Observation • Written tests • Writing reports

	✓ Identification ✓ Management ❑ Auditing and accounting	
4. Test software functionality	❑ Define software installation testing ❑ Installation checklist ❑ Functional Testing ✓ Mainline functions ✓ Basic Usability ✓ Accessibility ✓ Error Conditions	• Practical • Oral • Short tests • Learner portfolio of evidence.
5. Perform user training	❑ Keys to Developing an End User Training Plan ✓ Determine user skill set ✓ Creating a training program ✓ Setting training goals ✓ Training delivery methods ✓ Assessing end-user needs ❑ Training feedback	• Practical • Oral • Short tests
6. Perform software Maintenance	❑ Develop software maintenance schedule ❑ Evaluate the software ❑ Perform maintenance procedures ❑ Software maintenance report generated	• Practical • Oral • Short tests

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools
Diagnostic tools
Utility programs
Processor and memory optimizers

Wise Installer CruiseControl.Net Deploy Master Install Aware
Equipment External Hard disk Flash disk CD/DVD Computers
Materials and supplies • Digital instructional material including DVDs and CDs; • Operating system • Machines • Power • Application software
Reference materials Manufacturers manuals

ICT SECURITY THREATS

UNIT CODE: IT/CU/ICT/CR/3/6

Relationship to Occupational Standards
This unit addresses the unit of competency: **CONTROL ICT SECURITY THREATS**

Duration of Unit:200hours

Unit Description
This unit specifies competencies required to control ICT security threats. It involves identification of security threats, establishing and installing security measures, deployment of security measures, system vulnerability testing and monitoring.

Summary of Learning Outcomes
1. Identify security threats
2. Establish and Install security measures
3. Deploy security measures
4. Test system vulnerability
5. Monitor security system

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify security threats	❑ Definition of security threats ❑ Categories of security threats ✓ Internal ✓ external ❑ Importance of Computer Security to an Organization ❑ Identification of Common threats ✓ Fraud and theft ✓ Employee sabotage ✓ Loss of physical and infrastructure support ✓ Malicious hackers and code ✓ Industrial espionage ✓ Threats to personal privacy	• Practical • Oral questioning • Written tests

	✓ Natural Calamities ✓ Cyber crime ❑Constraints to computer security ✓ Cost ✓ User responsibility ✓ Integration challenges ✓ Inadequate Assessment	
2. Establish and Install security measures	❑ Definition of security risk management ❑ Benefits of Risk management ❑ Risk management procedures ✓ Risk assessment ✓ Risk mitigation Uncertainty analysis ✓ interdependencies ✓ cost considerations ❑ Benefits of security measures ❑ Types of Security measures ✓ Firewalls ✓ User accounts control ✓ Security policies ✓ Antivirus ✓ Encryption ✓ Secure Socket Layer protocol (SSL) ✓ Multi-factor authentication ✓ Malware detection ✓ Site monitoring ✓ Daily or weekly backups ❑ Application of security measures	• Written tests • Observation • Report writing • Practical
3. Deploy security measures	❑ Implement security measures contained in the ICT security policy ❑ Apply physical and logical risk mitigation measures ❑ Take corrective action	• Practical • Oral questioning • Short tests to assess underpinning knowledge.

	❑ Security audit to identify security gaps ❑ Generate system audit report	
4. Test system vulnerability	❑ Definition of vulnerability ❑ System testing schedule ❑ Levels of system vulnerability ❑ Ethical penetration ❑ System vulnerability test report	• Practical exercises • Oral questioning
5. Monitor security system	❑ Define monitoring criteria ❑ Evaluation of system security performance based on defined criteria ❑ updating and overhauling of Security systems ❑ Generate monitoring report	• Practical exercises • Oral questioning • Short tests to assess underpinned knowledge.

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools
1. Monitoring tools 2. CCTV 3. Maintenance tools 4. firewalls 5. antivirus 6. anti-spy ware 7. password management software

Equipment screw driver sensors cctv Computer
Materials and supplies • Digital instructional material including DVDs and CDs
Reference materials Manufacturers manuals

ICT SYSTEM SUPPORT

UNIT CODE: IT/CU/ICT/CR/4/6

Relationship to Occupational Standards
This unit addresses the unit of competency: **PERFORM ICT INFRASTRUCTURE SUPPORT**

Duration of Unit: 150hours

Unit Description:
This unit describes the competencies required to perform ICT infrastructure support. It involves identification and documentation of ICT infrastructure, evaluation of the state of performance and possible causes of failure, diagnosing and fixing of the problems, testing of performance and user training.

Summary of Learning Outcomes:
By the end of the unit, the trainee should be able to:
1. Identify and Document ICT infrastructure
2. Evaluate the state of performance and possible causes of failures
3. Diagnose and fix problems
4. Test component performance
5. Perform User training

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify and Document ICT infrastructure	❑ Definition of ICT infrastructure ❑ Components of ICT Infrastructure ❑ ICT Infrastructure specifications ❑ Types of ICT infrastructure ✓ Computer hardware platforms ✓ Operating system platforms ✓ Enterprise and other	• Practical exercises • Oral questioning • Learner portfolio of evidence

	software applications ✓ Data management and storage ✓ Networking and ✓ telecommunications platforms ✓ Internet platforms ✓ End users ❑ Safety precautions of ICT Infrastructure ❑ Documentation of Infrastructure assets and their operational and service status	
2 Evaluate the state of performance and possible causes of failures	❑ Define troubleshooting ❑ Possible causes of failure ✓ Unstable power ✓ Malfunctioning ✓ Mechanical faults ❑ Environmental factors ✓ Natural disasters ✓ Dust ✓ Ventilation ❑ User factors ✓ Malicious damage ✓ Accidents ✓ Lack of maintenance	• Observation • Practical • Projects
3. Diagnose and fix problems	❑ Define Diagnostic terms ❑ Identify diagnostic and repair tools and their functions ❑ Tools to diagnose and fix the problems. ❑ Hardware related problems ❑ Software related problems ❑ Internet/network related problems ❑ User related problems ❑ Role of ICT Policies in organizations	• Practical exercises • Oral questioning • Written tests • Learner portfolio of evidence.

4.Test component performance	❑ Test Hardware performance ❑ Test Software performance ❑ Test Internet/network performance ❑ Performance analysis ❑ Recommendation from performance analysis ❑ Performance test report	• Practical exercises • Oral questioning
5. Perform User training	❑ Meaning of user training ❑ Importance of user training ❑ Implement end user training plan	• Practical exercises • Oral questioning • Learner portfolio of evidence. • Observation

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools Comprehensive set of hand tools for the
Equipment • Computers • Printers • Servers • Scanners • Network components
Materials and supplies • Digital instructional material including DVDs and CDs; • Trunking • Cable ties

• Power • Network cabinets
Reference materials Manufacturers manuals

WEBSITE DESIGN

UNIT CODE: IT/CU/ICT/CR/5/6

Relationship to Occupational Standards
This unit addresses the unit of competency: **designing a website**

Duration of Unit:200hours

Unit Description
This unit specifies competencies required Design a Website. It involves gathering data required, determining website design tool, developing functional website, host website developed and perform website routine maintenance.

Summary of Learning Outcomes

1. Gather data required
2. Determine Website design tool
3. Develop functional website
4. Host Website developed
5. Perform Website Routine Maintenance

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Method
1. Gather data required for web site development	❑ Meaning of web terms. ❑ Importance of website ❑ Types of websites ❑ Website requirements ❑ Web Programming languages	• Observation • Written • Oral
2. Determine Website design tool	❑ Types of website authoring tools ❑ Criteria of choosing website authoring tools ❑ Installation and configuration of website authoring tools ❑ Use of website authoring tools	• Observation • Written • Oral
3. Develop functional website	❑ HTML CODING ✓ Formatting tags ✓ hyperlinks tag ✓ tables tags ✓ frames tags	• Observation • Written • Oral

	✓ forms tags ✓ list tags ❑ SCRIPTING ✓ functions of scripting languages ✓ types of scripting languages ❑ Java scripting ✓ JS Statements ✓ JS Variables ✓ JS Operators ✓ JS Data Types ✓ JS Functions ✓ JS Objects ✓ JS Events ✓ JS Strings ✓ JS Numbers ✓ JS Arrays PHP ✓ importance of PHP ✓ PHP Syntax ✓ PHP Variables ✓ PHP Data Types ✓ PHP Operators ✓ PHP control structures ✓ PHP Functions ✓ PHP Arrays ✓ PHP Forms ❑ Database creation ❑ Database Linkage	
4. Host Website developed	❑ Website hosting process ❑ Factors to consider when selecting a host ❑ Legal and regulatory requirements ❑ Domain name ❑ Uploading web site ❑ Security measures	• Observation • Written • Oral
5. Perform Website Routine Maintenance	❑ Importance of website testing ❑ Components of the website functionalities ❑ Creation, update and archiving of contents ❑ Generate maintenance report as per	• Observation • Written • Oral

	internal policy	

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer
- Guided learner activities
- Research project assignments
- Supervised activities and projects in a workshop

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting expert worker from the ICT sector
- Industrial visits.

Recommended Resources

Tools

Web development suite

- ✓ Dream weaver
- ✓ HTML
- ✓ CMS

Equipment

- ✓ Computer
- ✓ Software suite
- ✓ Hosting server

Materials and supplies

- Digital instructional material including DVDs and CDs;
- Internet connectivity
- Power

Reference materials

e-books

journals

COMPUTER REPAIR AND MAINTENANCE

UNIT CODE: IT/CU/ICT/CR/6/6

Relationship to Occupational Standards

This unit addresses the unit of competency**: Perform Computer Repair And Maintenance**

Duration of Unit:150hours

Unit Description:
This unit specifies competencies required to perform computer repair and Maintenance. It involves performing troubleshooting, disassembling of faulty components, repairing/replacing faulty components, testing of component functionality upgradation and testing of hardware and software.

Summary of Learning Outcomes:

1. Perform troubleshooting
2. Disassemble faulty components
3. Repair/Replace and reassemble faulty components
4. Test computer functionality
5. Upgrade computer software/hardware

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Method
1. Perform troubleshooting	❑ Computer parts ❑ Assembling and disassembling process ❑ Theory of probable cause ❑ Test of theory of probable cause ❑ problem identification ❑ appropriate solutions ❑ occupational safety and health standards	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.
2. Disassemble faulty components	❑ Tools for disassembling ❑ Procedures and techniques for disassembling ❑ Repair or replace and	• Practical exercises • Oral questioning • Written test • Learner portfolio

	reassemble components	of evidence.
3. Repair/Replace and reassemble components	❑ Determine components to replace or repair ❑ Procedures and Techniques for reassembling ❑ Component testing ❑ Repair/replace report	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.
4. Test computer functionality	❑ Computer testing tools ❑ Testing techniques ❑ Perform computer test functionality ❑ Status report	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.
5. Upgrade computer software/hardware	❑ Determine Reasons of upgrading ❑ procedures and techniques for upgrading	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools
Straight-head screwdriver, large and small.
Phillips-head screwdriver, large and small.
Tweezers or part retriever.
Needle-nosed pliers.
Wire cutters.
Chip extractor.
Hex wrench set.
Torx screwdriver

Equipment • Computer • Tool box
Materials and supplies Digital instructional material including DVDs and CDs
Reference materials Manufacturers manuals

DATABASE MANAGEMENT SYSTEM

UNIT CODE: IT/CU/ICT/CR/7/6

Relationship to Occupational Standards

This unit addresses the unit of competency: Manage database system

Duration of Unit: 250 hours

Unit Description:
This unit specifies competencies required to manage database system. They include identification of database management systems, designing of database, Creation and manipulation of database, database testing e.g. using dummy data, implementation of the designed database, establishing transaction and concurrency mechanism and managing database security

Summary of Learning Outcomes:

1. Identify database management system
2. Design database
3. Create and manipulate database
4. Perform database testing e.g. using dummy data
5. Implement designed database (roll out)
6. Establish transaction and concurrency mechanism
7. Manage database security

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Method
1. Identify database management system	❑ Define database management system, components and terminologies ❑ Classification of databases ❑ Understand various database management system	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.
2. Design database	❑ Define data abstraction, instances and schemas	• Practical exercises • Oral questioning

	❑ Types of Database structures ❑ Database operations ✓ INSERT ✓ SELECT ✓ UPDATE ✓ DELETE ❑ Data models ✓ ER- Models ✓ Relational Models ✓ Hierarchical models ✓ Network Models	• Written test • Learner portfolio of evidence.
3. Create and manipulate database	❑ Creation of tables • Primary and secondary key ❑ Linking of tables ❑ Data variables ❑ Database integration ❑ Database Querying - SQL	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.
4. Perform database testing e.g. using dummy data	❑ Integration testing ❑ DB Query testing ❑ Database test techniques ✓ Schema testing ✓ Stored procedure ✓ Trigger ✓ Stress ✓ views ✓ Benchmarking e.t.c ❑ Perform database testing ❑ Generate test report	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.
5. Implement designed database (roll out)	❑ Run the designed database ❑ Test the design and Database functionality	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence

6. Establish transaction and concurrency mechanism	❑ Transaction mechanisms ❑ Concurrency mechanisms ❑ Management of multiple transactions	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence
7.Manage database security	❑ Restriction of access as per Internal policy ❑ Types of restrictions ❑ Backup and recovery methods	• Practical exercises • Oral questioning • Written test

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools ✓DB Comparer ✓Ad miner ✓Firebird ✓DBeaver ✓phpMyAdmin ✓Navicat for MySQL ✓Test Data Generator ✓ Visual Query Designer
Equipment • computers • Servers

MANAGE INFORMATION SYSTEM

UNIT CODE: IT/CU/ICT/CR/8/6

Relationship to Occupational Standards

This unit addresses the unit of competency: **Management information system**

Duration of Unit: 150 hours

Unit Description:

This unit specifies competencies required to Manage information system. It involves identification of information system concepts, classification of information systems, management of information resources, Planning of information system, identification of impact of information system in an organization

Summary of Learning Outcomes:

1. Identify information system concepts
2. Classify information systems
3. Manage information resources
4. Information system planning
5. Impact of information system in organization

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
Identify information system concepts	❑ Define IS terms ❑ components of an IS ❑ roles of IS ❑ Qualities of an IS ❑ Types of systems ✓ Open ✓ Closed ✓ Probabilistic ✓ Cybernetic etc	• Practical exercises with observation checklist • Oral questioning • Written test

Classify information systems	❑ Strategic levels of an organization ✓ Operational level ✓ Knowledge level ✓ Tactical level ✓ Strategic level ❑ Classification of IS ✓ TPS(transaction processing) ✓ MIS(management ✓ KWS(knowledge work S) ✓ DSS (Decision support system) ✓ ESS (Executive support system) ❑ IS processing requirements ❑ functional areas of MIS	• Practical • Observation • Written test
Manage information resources	❑ Information resource management concepts ❑ IS resources ✓ hardware ✓ software ✓ databases ✓ networks ✓ procedures ✓ security facilities ✓ Physical buildings. ❑ Classification of IS Resources ❑ Importance of managing information resources	• Practical exercises • Oral questioning • Written test
Information system planning	❑ Definition of IS planning ❑ Importance of planning ❑ IS planning process ❑ IS planning techniques ❑ Project planning ✓ Causes of project failure and success ❑ Types of IS Acquisition methods ✓ In house ✓ Off the shelf	• Practical exercises • Oral questioning

	✓ Hire, outsource	
Impact of information system in organization	❑ Trends of IS ✓ Negative impacts ✓ Positive impacts ❑ Ethical ✓ Non disclosure NDA ✓ Privacy ✓ Data integrity ✓ code of conduct ❑ legal issues ✓ warrants ✓ bridge of contracts ✓ computer crimes ❑ IS maintenance	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools Transaction Processing Systems (TPS) Operation Information System (OIS Decision Support Systems (DSS) Enterprise resource planning (ERP)
Equipment • Computers • Operating System

Materials and supplies

Digital instructional material including DVDs and CDs

GRAPHIC DESIGN

UNIT CODE: IT/CU/ICT/CR/9/6

Relationship to Occupational Standards
This unit addresses the unit of competency: Perform graphic design

Duration of Unit: 200 hours

Unit Description:

This unit specifies competencies required to Perform Graphic Design. It involves Identification of graphic design concepts, identification of elements and principles of graphic design, application of typography techniques, creation and editing of images, perform of layout design and printing of the layout design.

Summary of Learning Outcomes:

1. Identify Graphic Design Concepts
2. Identify Elements and Principles of Graphic Design
3. Apply Typography Techniques
4. Create and Edit Images
5. Perform Layout Design
6. Print and Post the Design created

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
Identify Graphic Design Concepts	❑ Definition of graphic design ❑ Graphic Design Equipment ✓ Computer ✓ Scanner ✓ Printer ✓ Camera ✓Digital Tablet ❑ Application areas ✓ Corporate branding ✓ Packaging ✓ Printed materials ✓ Online art	• Practical exercises with observation checklist • Oral questioning • Written test • Learner portfolio of evidence.

Identify Elements and Principles of Graphic Design	❑ Definition of Elements ✓ Colour ✓ Line ✓ Shape ✓ Space ✓ Texture ✓ Value ❑ Principles of Graphic design ✓ Balance ✓ Contrast ✓ Emphasis ✓ Harmony ✓ Proportion ✓ Pattern ✓ Unity	• Practical • Project • Observation • Written test
Apply Typography Techniques	❑ Definition of Typography ❑ Definition and application of Anatomy ❑ Types of Typography ✓ Old style ✓ Transitional ✓ Modern ✓ Slab serif ✓ Gothic etc. ❑ Typography Techniques ✓ Kern upside down ✓ Blur it ✓ Kern with balloons ✓ Rough our headlines etc.	• Practical exercises • Oral questioning • Written test
Create and Edit Images	❑ Types of Graphic design software ✓ Adobe Photoshop ✓ Adobe InDesign ✓ Corel Draw ✓ Paint.net ❑ Types of Image file types	• Practical exercises • Oral questioning • Learner portfolio of evidence.

	✓ Raster ✓ Vector ❑ Creation of : ✓Letterforms ✓lines of type ✓body copy ❑ Techniques of image manipulation ✓ Colour blending ✓ Image merging ✓ Texture use ✓ Proportion etc. ❑ Creation of Images using Adobe Photoshop	
Perform Layout Design	❑ Proportion and its application areas ❑ Types of Unified systems ❑ Typographic tools	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.
Print the Design created	❑ Tools and equipment for printing ❑ Types of printing ❑ Printing papers classification	•

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools

❑ Illustrator
❑ Adobe InDesign
❑ Adobe Photoshop
❑ Paint.net
❑ Corel Draw

Equipment • Computers • Printers • Scanners • Camera • Digital Tablet
Materials and supplies Digital instructional material including DVDs and CDs

COMPUTER PROGRAMMING

UNIT CODE: IT/CU/ICT/CR/10/6

Relationship to Occupational Standards
This unit addresses the competency: **Develop computer program**

Duration of Unit: 300 hours

Unit Description:

This unit specifies competencies required to develop computer program. It involves Identifying program and programming concepts, identifying phases of program development, perform program design and Analysis, develop a Computer program, Perform Program testing and debugging, Perform User training and Program Maintenance.

Summary of Learning Outcomes:

1. Identify program and programming concepts
2. Identify Phases of Program development
3. Perform program design and Analysis
4. Develop a Computer program
5. Perform Program testing and debugging
6. Perform User training and Program Maintenance

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify program and programming concepts	❑ Definition of program and programming ❑ Programming concepts ✓ Program structure ✓ Variable declaration ✓ Looping structures ✓ Control structures ✓ Syntax ❑ Programming languages ✓ Object oriented ✓ Functional ✓ Imperative ✓ Declarative	• Practical exercises with observation checklist • Oral questioning • Written test • Learner portfolio of evidence.

	❑ Approaches of program development ✓ Waterfall ✓ Agile ✓ Spiral etc	
2. Identify Phases of Program development	❑ Phases of program development ✓ Planning ✓ System analysis and design ✓ System development ✓ Testing ✓ Implementation	• Practical • Project • Observation • Written test
3. Perform program design and Analysis	❑ Definition of program design and analysis ❑ Program design and analysis tools ✓ Dataflow diagram ✓ Pseudocode ✓ HIPO Diagram ✓ Structure charts ❑ Software design levels ✓ High level design ✓ Detailed design ✓ Architectural design ❑ Types of system design ✓ Form design ✓ File organization design ✓ Database design	• Practical exercises • Oral questioning • Written test
4. Develop a Computer program	❑ Format of a computer program ✓ Source code ✓ Components of the program: Program header, declarations, main body ✓ Interrelationships between components ✓ Data structures ❑ Fundamentals of structured programming using C language ✓ Special features ✓ Structure of C language ✓ Variables and constants ✓ Input/output functions ✓ Literal reserved words ✓ Identifiers ✓ Data types and their sizes ✓ Conditional statements	• Practical exercises • Oral questioning • Learner portfolio of evidence.

	✓ Loop control ✓ C functions ✓ Library functions ✓ User defined functions ✓ Arguments and parameters ❑ Fundamentals of Object Oriented programming using Java ✓ Object oriented programming ✓ Java language ✓ Java Virtual Machine ✓ Java Libraries ✓ Program structure ✓ Java Output ✓ Variables and expressions ✓ Classes and objects ✓ Input in java ✓ Data types and operators ✓ Boolean statements ✓ Loops and program flow ✓ Arrays ✓ Exception handling	
5. Perform Program testing and debugging	❑ Difference between testing and debugging. ❑ Types of testing ✓ Smoke ✓ Functional ✓ Usability ✓ Security ✓ Performance ✓ Regression ✓ Compliance ❑ Levels of testing ✓ Unit ✓ Integration ✓ System ✓ Acceptance ❑ Methods of testing ✓ Black box ✓ White box ✓ Gray box ✓ Agile	• Practical exercises • Oral questioning • Written test • Learner portfolio of evidence.

	✓ Adhoc ❑ Debugging steps ❑ Debugging requirements ❑ Debugging principles ❑ Debugging techniques	
6. Perform User training and Program Maintenance	❑ Identification of user training needs ❑ Methods of user training ❑ User training manuals ❑ Maintenance schedule ❑ System maintenance tools and techniques. ❑ Monitoring of system performance ❑ Rectification of bugs ❑ Handling requested changes	•

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools Comprehensive set of tools. ❑ Flow charts ❑ Data flow diagram ❑ Decision table ❑ Data dictionary ❑ Decision tree
Equipment • Computer • Software

Materials and supplies

Digital instructional material including DVDs and CDs

MOBILE APPLICATION DEVELOPMENT

UNIT CODE: IT/CU/ICT/CR/11/6

Relationship to Occupational Standards
This unit addresses the competency: **Develop Mobile Application**

Duration of Unit: 350 Hours

Unit Description:

This unit specifies competencies required to develop computer program. It involves Identifying Mobile application concepts, identifying mobile application development environment, identifying Application Design Issues, actual Development of mobile application, testing of the developed mobile application and Publishing and Commercializing the developed Application.

Summary of Learning Outcomes:

1. Identify Mobile application concepts
2. Identify mobile application development environment
3. Identify Application Design Issues
4. Develop mobile application
5. Test the developed mobile application
6. Publish and Commercialize the developed Application

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify Mobile application concepts	1.1.Definition of Mobile application 1.2.Types of Mobile applications ❑ Hybrid ❑ Native 1.3.Mobile application development approaches ❑ Native ❑ Hybrid Native ❑ Hybrid web ❑ Progressive web 1.4.Reasons for mobile application	• Practical exercises with observation checklist • Oral questioning • Written test •

	development	
2. Identify mobile application development environment	❑ Definition of Mobile Application Development Architecture ❑ Mobile Application Development Architecture ➢ Stack ➢ Linux Kernel ➢ DVM – Dalvik virtual Machine ➢ SDK ❑ Reference Architecture ➢ Model view presenter ➢ Wildlife ❑ Mobile development frameworks ➢ Native script ➢ Flutter ➢ React Native ❑ Mobile application development tools ➢ Integrated Development Environment (IDE) ➢ Graphic User Interface (GUI) ➢ Emulator ➢ Android SDK	• Practical • Project • Observation • Written test
3. Identify Application Design Issues	❑ Mobile development lifecycle ➢ Setup ➢ Develop ➢ Test and Debug ➢ Publish ❑ Overarching Design principles and Guidelines ➢ Platform ➢ Customer Benefit ➢ Device ➢ Scalability etc ❑ Mobile application Navigation Patterns ➢ Hamburger Menu ➢ Tab bar ➢ Gesture based	• Practical exercises • Oral questioning • Written test

4. Develop mobile application	❑ Mobile Application development software ➢ Integrated Development Environment (IDE) ➢ Android SDK ❑ Androidmanifest.XML Configuration ❑ Resources defined in XML ➢ Res/Layout ➢ Res/Menu ➢ Res/Value ➢ Res/Drawable ❑ Framework components ➢ Activity ➢ Services ➢ Broadcast receiver ➢ Content provider ❑ SDK Configuration ❑ Building and setting up of the Application	• Practical exercises • Oral questioning
5. Test the developed mobile application	❑ Testing techniques and procedures ➢ Usability testing ➢ Installation testing ➢ Cloud testing etc ❑ Definition of Debugging ❑ Debugging techniques	• Practical exercises • Oral questioning • Written test •
6. Publish and Commercialize the developed Application	❑ Application distribution through application stores ❑ Monetizing applications through mobile money APIs ❑ upgrading and patching of the application	•

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools Integrated Development Environment (IDE) Graphic User Interface (GUI) Emulator Android SDK
Equipment • Computer • Software • Mobile device
Materials and supplies Digital instructional material including DVDs and CDs

SYSTEM ANALYSIS AND DESIGN

UNIT CODE: IT/CU/ICT/CR/12/6

Relationship to Occupational Standards
This unit addresses the competency: **System Analysis And Design**

Duration of Unit: 180 Hours

Unit Description:
This unit specifies competencies required to develop computer program. It involves understanding of System Analysis and Design fundamentals, understanding approaches to system Development and Project planning, Performing System Analysis, identify Essentials of System Design, understand advanced Design Concepts, Perform System implementation and Understand Current Trends in System Development.

Summary of Learning Outcomes:
1. Understand System Analysis and Design Fundamentals
2. Understand Approaches to system Development and Project planning.
3. Perform System Analysis
4. Identify Essentials of System Design
5. Understand advanced Design Concepts
6. Perform System Implementation
7. Understand Current Trends in System Development

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
Understand System Analysis and Design Fundamentals	❑ Define system, system design and system analysis ❑ Constrains of system ✓ Interconnectivity ✓ Objectives of organization ❑ Properties of a system ✓ Organization ✓ Interaction ✓ Interdependence ✓ Integration	• Practical exercises with observation checklist • Oral questioning • Written test •

	❑ Elements of a system ✓ Control ✓ Input ✓ Process ✓ Output ❑ Classification of systems ❑ Types of Information system ✓ Physical ✓ Open or closed ✓ Adaptive and non-adaptive ✓ Permanent and temporary ❑ System models ✓ Schematic ✓ Flow system ✓ Static system ✓ Dynamic system ❑ Categories of Information ✓ Strategic ✓ Management ✓ Operational	
Understand Approaches to system Development and Project planning.	❑ System development Approaches ❑ System development methodologies ❑ System development life cycle models ❑ Activities involved in SDLC ❑ SDLC phases ❑ Project planning concepts	• Practical • Project • Observation • Written test
Perform System Analysis	❑ Overview of system Analysis ❑ Role of a system Analyst ❑ Attributes of structured analysis ✓ Graphic ✓ Logical ✓ Process division ✓ High level to lower level approach ❑ Tools for system analysis ✓ Data Flow Diagrams ✓ Data Dictionary ✓ Decision Trees ✓ Decision Tables	• Practical exercises • Oral questioning • Written test

	✓ Structured English ✓ Pseudocode Activities performed during System analysis ✓ Gather detailed Information ✓ Define requirements ✓ Prioritize requirements ✓ Develop user-interface dialogs ✓ Evaluate requirement with users ✓ Define functional requirements	
Identify Essentials of System Design	❑ Design with Software specification requirements (SRS) document ❑ Components of system design ✓ Quality ✓ Timeliness ✓ Cost-Effectiveness ❑ Inputs ✓ Statement of work ✓ Requirement determination plan ✓ Current situation analysis ✓ Proposed system requirements including a conceptual data model, modified DFDs, and Metadata (data about data) ❑ Outputs ✓ Infrastructure and organizational changes for the proposed system. ✓ A data schema, often a relational schema. ✓ Metadata to define the tables/files and columns/data-items. ✓ A function hierarchy diagram or web page map that graphically describes the program structure. ✓ Actual or pseudocode for each module in the program.	• Practical exercises • Oral questioning

	✓ A prototype for the proposed system ❑ Stages of system design ✓ Requirements determination ✓ Requirements specifications ✓ Feasibility Analysis ✓ Final Specifications ✓ Hardware study ✓ System Design ❑ Types of system design ✓ Logical ✓ Physical ✓ Architectural ✓ Detailed ❑ Data Modelling techniques ✓ Conceptual ✓ Relational ✓ Object Oriented	
Understand advanced Design Concepts	❑ Types of Advance Design modelling ❑ File Organization Methods ✓ Serial ✓ Sequential ✓ Direct ✓ Indexed ❑ File access methods ✓ Sequential ✓ Direct ❑ System security Control ✓ Privacy ✓ Integrity ❑ System Control Measures ✓ Backup ✓ Physical Access ✓ Logical ❑ Structured Design Concepts ✓ Input ✓ Output ✓ User interface ✓ Modularization	• Practical exercises • Oral questioning • Written test •
Perform System Implementation	❑ System implementation procedures ✓Program Development	•

	✓Quality Assurance ✓Data Conversion ❑ Types of the system testing ✓Software ✓Unit ✓Integration ✓Usability ❑ Deployment procedures of the system ✓Installation ✓Documentation ✓Training ✓Maintenance	
Understand Current Trends in System Development	❑ Frameworks, components and services are identified ✓ Object Frameworks ✓ Component standards and infrastructure ✓ Service Standards ❑ Model driven architecture is understood ✓ MDA Approach ✓ MDA tools ❑ Adaptive methodologies to development are understood ✓ Agile Software Development ❑ Software principles and practices are identified ✓ Abstraction ✓ Models and Modelling ✓ Patterns ✓ Reuse ✓ Methodologies	•

Suggested Methods of Delivery

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

- Visiting lecturer/trainer from the ICT sector;
- Industrial visits.

Recommended Resources

Tools ✓ Data Flow Diagrams ✓ Data Dictionary ✓ Decision Trees ✓ Decision Tables ✓ Structured English
Equipment • Computer • Software • Mobile phones • Tablets •
Materials and supplies Digital instructional material including DVDs and CDs
Reference materials Appropriate Mobile Application Development text books