# COMPETENCY STANDARD

# Android Mobile Application Development

**Level: 04**

**(ICT Sector)**

**Competency Standard Code: CS-ICT-MAD-L4-EN-V1**

**National Skills Development Authority**
**Prime Minister's Office**
**Government of the People's Republic of Bangladesh**

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This Competency Standard for Android Mobile Application Development is a document for the development of curricula, teaching and learning materials, and assessment tools. It also serves as the document for providing training consistent with the requirements of industry in order to meet the qualification of individuals who graduated through the established standard via competency-based assessment for a relevant job.

This document has been validated by NSDA in association with Information Communication Technology Sector ISC, industry representatives, academia, related specialist, trainer and related employee.

Public and private institutions may use the information contained in this standard for activities benefitting Bangladesh.

## Introduction

The NSDA aims to enhance an individual's employability by certifying completeness with skills. NSDA works to expand the skilling capacity of identified public and private training providers qualitatively and quantitatively. It also aims to establish and operationalize a responsive skills ecosystem and delivery mechanism through a combination of well-defined set of mechanisms and necessary technical supports.

Key priority economic growth sectors identified by the government have been targeted by NSDA to improve current job skills along with existing workforce to ensure required skills to industry standards. Training providers are encouraged and supported to work with industry to address identified skills and knowledge to enable industry growth and increased employment through the provision of market responsive inclusive skills training program. " Android Mobile Application Development" is selected as one of the priority occupations of Information Communication Technology Sector. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

Generally, a competency standard informs curriculum, learning materials, assessment and certification of trainees enrolled in Skills Training. Trainees who successfully pass the assessment will receive a qualification in the National Skills Qualification Framework (NSQF) under Bangladesh National Qualification Framework (BNQF) and will be listed on the NSDA's online portal.

This competency standard is developed to improve skills and knowledge in accordance with the job roles, duties and tasks of the occupation and ensure that the required skills and knowledge are aligned to industry requirements. A series of stakeholder consultations, workshops were held to develop this document.

The document also details the format, sequencing, wording and layout of the Competency Standard for an occupation which is comprised of Units of Competence and its corresponding Elements.

**Overview**

A competency standard is a written specification of the knowledge, skills and attitudes required for the performance of an occupation, trade or job corresponding to the industry standard of performance required in the workplace.

The purpose of a competency standards is to:

- provide a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enable industry recognised qualifications to be awarded through direct assessment of workplace competencies
- encourage the development and delivery of flexible training which suits individual and industry requirements
- encourage learning and assessment in a work-related environment which leads to verifiable workplace outcomes

Competency standards are developed by a working group comprised of representative from NSDA, Key Institutions, ISC, and industry experts to identify the competencies required of an occupation in Informal Sector.

Competency standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. CS acknowledge that people can achieve technical and vocational competency in many ways by emphasizing what the learner can do, not how or where they learned to do it.

With competency standards, training and assessment may be conducted at the workplace or at training institute or any combination of these.

Competency standards consist of a number of units of competency. A unit of competency describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

Units of competency are documented in a standard format that comprises of:

- unit title
- nominal duration
- unit code
- unit descriptor
- elements and performance criteria
- variables and range statement
- curricular content guide
- assessment evidence guides

Together, all the parts of a unit of competency:

- describe a work activity
- guide the assessor to determine whether the candidate is competent or not yet competent

The ensuing sections of this document comprise of a description of the relevant occupation, trade or job with all the key components of a unit of competency, including:

- a chart with an overview of all Units of Competency for the relevant occupation, trade or job including the Unit Codes and the Unit of Competency titles and corresponding Elements
- the Competency Standard that includes the Unit of Competency, Unit Descriptor, Elements and Performance Criteria, Range of Variables, Curricular Content Guide and Assessment Evidence Guide.

# Competency Standards for National Skills Certificate – Level-4 in Android Mobile Application Development in ICT Sector

## Level Descriptors of NSQF (BNQF 1-6)

| **Level & Job Classification** | **Knowledge Domain** | Skills Domain | **Responsibility Domain** |
|---|---|---|---|
| 6-Mid-Level Manager/ Sub Assistant Engineer | Comprehensive actual and theoretical knowledge within a specific work or study area with an awareness of the validity and limits of that knowledge, able to analyse, compare, relate and evaluate. | Specialised and wider range of cognitive and practical skills required to provide leadership in the development of creative solutions to defined problems. Communicate professional issues and solutions to the team and to external partners/users. | Work under broad guidance and self-motivation to execute strategic and operational plan/s. Lead lower-level management. Diagnose and resolve problems within and among work groups. |
| 5-Supervisor | Broad knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to scrutinize and break information into parts by identifying motives or causes. | Broad range of cognitive and practical skills required to generate solutions to specific problems in one or more work or study areas. Communicate practice-related problems and possible solutions to external partners. | Work under guidance of management and self-direction to resolve specific issues. Lead and take responsibility for the work and actions of group/team members. Bridge between management. |
| 4-Highly Skilled Worker | Broader knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to solve problems to new situations by comparing and applying acquired knowledge. | A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying the full range of methods, tools, materials and information. Communicate using technical terminology and IT technology with partners and users as per workplace requirements. | Work under minimal supervision in specific contexts in response to workplace requirements. Resolve technical issues in response to workplace requirements and lead/guide a team/ group. |
| 3-Skilled Worker | Moderately broad knowledge in a specific work or study area, able to perceive ideas and abstract from drawing and design according to workplace requirements. | Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools. Communicate with his team and limited external partners upholding the values, nature and culture of the workplace | Work or study under supervision with considerable autonomy. Participate in teams and responsible for group coordination. |
| 2-Semi Skilled Worker | Basic understanding of underpinning knowledge in a specific work or study area, able to interpret and apply common occupational terms and instructions. | Skills required to carry out simple tasks, communicate with his team in the workplace presenting and discussing results of his work with required clarity. | Work or study under supervision in a structured context with limited scope of manipulation |
| 1 –Basic Skilled Worker | Elementary understanding of ability to interpret the underpinning knowledge in a specific study area, able to interpret common occupational terms and instructions. | Specific Basic skills required to carry out simple tasks. Interpret occupational terms and present the results of own work within guided work environment/ under supervision. | Work under direct supervision in a structured context with limited range of responsibilities. |

**List of Abbreviations**

| **General** | |
|---|---|
| NSDA | National Skills Development Authority |
| BMET | Bureau of Manpower Employment and Training |
| ILO | International Labor Organization |
| ISC | Industry Skills Council |
| NPVC | National Pre-Vocation Certificate |
| NSQF | National Skills Qualifications Framework |
| PPP | Public Private Partnership |
| SCVC | Standards and Curriculum Validation Committee |
| SEIP | Skills for Employment Investment Program |
| STP | Skills Training Provider |
| UoC | Unit of Competency |
| OSH | Occupational Health and Safety |
| SOP | Standard Operating Procedures |
| PPE | Personal Protective Equipment |
| SQL | Structured Query Language |
| OOP | Object Oriented Programming Language |
| API | Application Programming Interface |
| FCM | Firebase Cloud Messaging |
| TDD | Test Driven Development |
| APK | Android Application Package |

## Approval of Competency Standard

Approved by
10th Executive Committee (EC) Meeting of NSDA
Held on 19th August 2022

Deputy Director (Admin)
and
Officer of Secretarial Duties for EC Meeting
National Skills Development Authority

# Contents

# Competency Standards for National Skill Certificate – 4 in Android Mobile Application Development in ICT Sector

## Course Structure

| SL | Unit Code and Title | | UoC Level | Nominal Duration (Hours) |
|---|---|---|---|---|
| **Generic Units of Competencies** | | | | **50** |
| 1. | GU-02-L2-V1 | Apply occupational health and safety (OHS) practice in the workplace | 2 | 15 |
| 2. | GU-08-L2-V1 | Work in a Team Environment | 2 | 20 |
| 3. | GU-11-L3-V1 | Make a Presentation | 3 | 15 |
| **Sector Specific Units of Competencies** | | | | **15** |
| 4. | SU-ICT-05-L3-V1 | Comply with ethical standards in the ICT workplace | 3 | 15 |
| **Occupation Specific Units of Competencies** | | | | **295** |
| 5. | OU-ICT-AMAD-01-L4-V1 | Work with Kotlin Basics | 4 | 40 |
| 6. | OU-ICT-AMAD-02-L4-V1 | Work with OOP and Design Pattern | 4 | 45 |
| 7. | OU-ICT-AMAD-04-L4-V1 | Work with Android Basic | 4 | 50 |
| 8. | OU-ICT-AMAD-05-L4-V1 | Manage Database | 4 | 40 |
| 9. | OU-ICT-AMAD-05-L4-V1 | Perform Application Programming Interface integration | 4 | 40 |
| 10. | OU-ICT-AMAD-06-L4-V1 | Implement Background Service and Application Deployment | 4 | 40 |
| 11. | OU-ICT-AMAD-07-L4-V1 | Perform Project Work with Android | 4 | 40 |
| **Total Nominal Learning Hours** | | | | **360** |

## Units & Elements at Glance

## Generic Units of Competencies

| SL | Code | Unit of competency | Elements of Competency | Duration (hours) |
|---|---|---|---|---|
| 1. | GU-02-L2-V1 | Apply Occupational Safety and Health (OSH) Procedure in the Workplace | 1. Identify OSH policies and procedures<br>2. Follow OSH procedure<br>3. Report hazards and risks<br>4. Respond to emergencies<br>5. Maintain personal well-being | 15 |
| 2. | GU-08-L2-V1 | Work in a Team Environment | 1. Define team role and scope<br>2. Identify individual role and responsibility<br>3. Participate in team discussions<br>4. Work as a team member | 20 |
| 3. | GU-11-L3-V1: | Make a Presentation | 1. Prepare written presentation<br>2. Identify interview techniques<br>3. Prepare official presentation | 15 |
| **Total hours** | | | | **50** |

## Sector Specific Units of Competencies

| SL | Code | Unit of competency | Elements of Competency | Duration (hours) |
|---|---|---|---|---|
| 1 | SU-ICT-05-L3-V1 | Comply to Ethical Standards in the ICT Workplace | 1. Uphold the requirements of clients<br>2. Deliver quality products and services<br>3. Maintain professionalism at workplace<br>4. Maintain workplace code of conduct. | 15 |
| **Total hours** | | | | **15** |

## Occupation-Specific Units of Competencies

| SL | Code | Unit of competency | Elements of competency | Duration (hours) |
|---|---|---|---|---|
| 1. | OU-ICT-AMAD-01-L4-V1 | Work with Kotlin Basics | 1. Create Kotlin data types<br>2. Use Kotlin | 40 |
| 2. | OU-ICT-AMAD-02-L4-V1 | Work with OOP and Design Pattern | 1. Describe class properties, constants & visibility<br>2. Apply encapsulation<br>3. Apply inheritance<br>4. Use Polymorphism<br>5. Use design pattern | 45 |
| 3. | OU-ICT-AMAD-03-L4-V1 | Work with Android Basic | 1. Deploy android platform<br>2. Use main building blocks<br>3. Create android user interface | 50 |
| 4. | OU-ICT-AMAD-04-L4-V1 | Manage Database | 1. Demonstrate use of preferences & file system<br>2. Work with basic database<br>3. Operate SQLite Database<br>4. Use lists and adapters<br>5. Use content providers | 40 |
| 5. | OU-ICT-AMAD-05-L4-V1 | Perform Application Programming Interface integration | 1. Use API<br>2. Implement custom API | 40 |

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| | | | 3. Implement firebase API<br>4. Implement Firebase Cloud Messaging (FCM) | |
| 6. | OU-ICT-AMAD-06-L4-V1 | Implement Background Service and Application Deployment | 1. Implement broadcast receivers<br>2. Start a service<br>3. Perform Test Driven Development (TDD)<br>4. Introduce application signing and deployment | 40 |
| 7. | OU-ICT-AMAD-07-L4-V1 | Perform Project Work with Android | 1. Interpret project management basics<br>2. Develop an application in Android<br>3. Develop user story<br>4. Perform unit testing<br>5. Create project presentation<br>6. Develop awareness about rights | 40 |
| | **Total Nominal Hours** | | | **295** |

# Generic Units of Competencies

| Unit Code and Title | **GU-02-L2-V1: Apply Occupational Safety and Health (OSH) Procedure in the Workplace** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to apply occupational safety and health (OSH) procedure in the workplace.<br>It specifically includes the task of identifying OSH policies and procedures, following OSH procedure, reporting hazards and risks, responding to emergencies and maintaining personal well-being. |
| **Nominal Hours** | **15 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & Underlined** terms are elaborated in the Range of Variables |
| 1. Identify OSH policies and procedures | 1.1. **OSH policies** and **safe operating procedures** are accessed and stated<br>1.2. **Safety signs and symbols** are identified and followed<br>1.3. Emergency response, evacuation procedures and other contingency measures are determined according to workplace requirements |
| 2. Follow OSH procedure | 2.1 **Personal protective equipment (PPE)** is selected and collected as required<br>2.2 Personal protective equipment (PPE) is correctly used in accordance with organization OSH procedures and practices<br>2.3 A clear and tidy workplace is maintained as per workplace standard<br>2.4 PPE is maintained to keep them operational and compliant with OSH regulations |
| 3. Report hazards and risks | 3.1 **Hazards** and risks are identified, assessed and controlled<br>3.2 Incidents arising from hazards and risks are reported to designated authority |
| 4. Respond to emergencies | 4.1 Alarms and warning devices are responded<br>4.2 Workplace **emergency procedures** are followed<br>4.3 **Contingency measures** during workplace accidents, fire and other emergencies are recognized and followed in accordance with organization procedures<br>4.4 First aid procedures are applied during emergency situations |
| 5. Maintain personal well-being | 5.1 OSH policies and procedures are adhered to OSH awareness programs are participated in as per workplace guidelines and procedures. |

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| | 5.2 Corrective actions are implemented to correct unsafe condition in the workplace<br>5.3 **"Fit to work" records** are updated and maintained according to workplace requirements |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |
| 1. OSH policies | 1.1. Bangladesh standards for OSH<br>1.2. Fire Safety Rules and Regulations<br>1.3. Code of Practice<br>1.4. Industry Guidelines |
| 2. Safe operating procedures | 2.1 Orientation on emergency exits, fire extinguishers, fire escape, etc.<br>2.2 Emergency procedures<br>2.3 First Aid procedures<br>2.4 Tagging procedures<br>2.5 Use of PPE<br>2.6 Safety procedures for hazardous substances |
| 3. Safety signs and symbols | 3.1 Direction signs (exit, emergency exit, etc.)<br>3.2 First aid signs<br>3.3 Danger Tags<br>3.4 Hazard signs<br>3.5 Safety tags<br>3.6 Warning signs |
| 4. Personal Protective Equipment (PPE) | 4.1 Gas Mask<br>4.2 Gloves<br>4.3 Safety boots<br>4.4 Face mask<br>4.5 Overalls<br>4.6 Goggles and safety glasses<br>4.7 Sun block<br>4.8 Chemical/Gas detectors |
| 5. Hazards | 5.1 Chemical hazards<br>5.2 Biological hazards<br>5.3 Physical Hazards<br>5.4 Mechanical and Electrical Hazard<br>5.5 Mental hazard<br>5.6 Ergonomic hazard |
| 6. Emergency procedures | 6.1 Fire fighting<br>6.2 Earthquake<br>6.3 Medical and first aid |

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| | 6.4 Evacuation |
| 7. Contingency measures | 7.1 Evacuation<br>7.2 Isolation<br>7.1 Decontamination |
| 8. "Fit to Work" records | 8.1 Medical Certificate every year<br>8.2 Accident reports, if any<br>8.3 Eye vision certificate |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency | |
| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 stated OSH policies and safe operating procedures<br>1.2 followed safety signs and symbols<br>1.3 used personal protective equipment (PPE)<br>1.4 maintained workplace clear and tidy<br>1.5 assessed and Controlled hazards<br>1.6 followed emergency procedures<br>1.7 followed contingency measures<br>1.8 implemented corrective actions |
| 2. Underpinning knowledge | 2.1 Define OSH<br>2.2 OSH Workplace Policies and Procedures<br>2.3 Work safety procedures<br>2.4 Emergency procedures<br>2.5 Hazard control procedure<br>2.6 Different types of hazards<br>2.7 PPE and there uses<br>2.8 Personal hygiene practices<br>2.9 OSH awareness |
| 3. Underpinning skills | 3.1 Accessing OSH policies<br>3.2 Using of PPE<br>3.3 Handling cleaning tools and equipment<br>3.4 Writing report<br>3.5 Responding to emergency procedures |
| 4. Required attitude | 4.1 Commitment to occupational health and safety<br>4.2 Sincere and honest to duties<br>4.3 Promptness in carrying out activities<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect of peers and seniors in workplace<br>4.8 Communicate with peers and seniors in workplace |

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| 5. Resource implications | 5.1 Workplace<br>5.2 Equipment and outfits appropriate in applying safety measures<br>5.3 Tools, equipment, materials and documentation required<br>5.4 OSH Policies and Procedures |
| 6. Methods of assessment | Competency should be assessed by:<br>6.1 Written test<br>6.2 Demonstration<br>6.3 Oral questioning |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited assessment centre<br>7.2 Assessment should be done by a NSDA certified/nominated assessor |

**Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

| Unit Code and Title | **GU-08-L2-V1: Work in a Team Environment** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to work in a team environment.<br>It specifically includes the task of defining team role and scope, identifying individual role and responsibility, participating in team discussions and working as a team member. |
| **Nominal Hours** | **20 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & Underlined** terms are elaborated in the Range of Variables |
| 1. Define team role and scope | 1.1. Role and objectives of the team are defined<br>1.2. Team structure, responsibilities and reporting relations are identified from team discussions and other external sources |
| 2. Identify individual role and responsibility | 2.1 Individual roles and responsibilities of **team members** are identified<br>2.2 Reporting relationships among team members are defined and clarified<br>2.3 Reporting relationships external to the team are defined and clarified |
| 3. Participate in team discussions | 3.1 Ideas related to team plans are contributed<br>3.2 Recommendations for improving team work are put forward |
| 4. Work as a team member | 4.1 Effective forms of communication are used to interact with team members<br>4.2 Communication channels are followed<br>4.3 OHS practices are followed |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |
| 1. Team Members | 1.1 Coach/mentor<br>1.2 Supervisor/Manager<br>1.3 Peers/Colleagues<br>1.4 Employee representative |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency | |
| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 demonstrated knowledge in working in a team environment.<br>1.2 satisfied the requirements mentioned in the |

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| | 1.3 Performance Criteria and Range of Variables |
| 2. Underpinning knowledge | 2.1 Team structure, role and responsibility<br>2.2 Individual members' roles and responsibilities<br>2.3 Communication flow and reporting structures<br>2.4 Team planning<br>2.5 Interpersonal communication skills<br>2.6 Team meeting procedures<br>2.7 OHS practices |
| 3. Underpinning skills | 3.1 Identifying the role and responsibility of the team<br>3.2 Identifying roles and responsibilities of individual members<br>3.3 Participating in team discussions<br>3.4 Working as a team member |
| 4. Required attitude | 4.1 Commitment to occupational health and safety<br>4.2 Sincere and honest to duties<br>4.3 Promptness in carrying out activities<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect of peers and seniors in workplace<br>4.8 Communicate with peers and seniors in workplace |
| 5. Resource implications | 5.1 Pens<br>5.2 Telephone<br>5.3 Computer<br>5.4 Writing materials<br>5.5 Online communication |
| 6. Methods of assessment | Competency should be assessed by:<br>6.1 Written test<br>6.2 Demonstration<br>6.3 Oral questioning |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited assessment centre<br>7.2 Assessment should be done by a NSDA certified/nominated assessor |

**Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

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| **Unit Code and Title** | **GU-11-L3-V1: Make a Presentation** |
| **Unit descriptor** | This unit covers the skills, knowledge and attitudes required to make a presentation. It specifically includes preparing a written presentation, identifying interview techniques and preparing official presentation. |
| **Nominal Hours** | 15 Hours |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & Underlined** terms are elaborated in the Range of Variables Training Components |
| 1. Prepare written presentation | 1.1 Personal written presentation matters and requirements are identified.<br>1.2 Standard resume writing techniques are identified and applied.<br>1.3 Standard coverletter points are clearly explained and utilised.<br>1.4 Portfolio is created on professional social media. |
| 2. Identify interview techniques | 2.1 **Types of interviews** are identified and explained.<br>2.2 Interview techniques are identified and described.<br>2.3 Steps to prepare for interview are identified and employed.<br>2.4 Interview phases are identified and recognised. |
| 3. Prepare official presentation | 3.1 **Presentation media** is identified.<br>3.2 Presentation plan is outlined.<br>3.3 Presentation is prepared. |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to) |
| 1. Types of interviews | 1.1 Written<br>1.2 Oral<br>1.2.1. One-on-one<br>1.2.2. Group<br>1.2.3. Telephone<br>1.2.4.<br>1.3 Online<br>1.4 Demonstration |
| 2. Presentation media | 2.1 Board<br>2.2 Poster paper<br>2.3 Slides<br>2.4 Photographs<br>2.5 Audio<br>2.6 Video<br>2.7 Website |
| Evidence guides<br>The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the unit of competency. | |
| 1. Critical aspects of | Assessment must evidence that the candidate:<br>1.1 created personal written presentation |

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| competency | 1.2 applied different techniques to interview<br>1.3 prepared official presentation |
| 2. Underpinning knowledge | 2.1 Curriculum Vitae/Resume<br>2.2 Coverletter<br>2.3 Presentation media |
| 3. Underpinning skills | 3.1 Create personal written presentation<br>3.2 Identify interview techniques<br>3.3 Prepare for different types of interviews<br>3.4 Develop official presentation |
| 4. Underpinning attitudes | 4.1 Active on teamwork<br>4.2 Prompt in carrying out activities<br>4.3 Tidy and punctual<br>4.4 Respectful of peers, subordinates and seniors in the workplace<br>4.5 Sincere and honest concerning duties |
| 5. Resource implications | 5.1 The following resources must be provided:<br>5.2 Workplace (simulated or actual)<br>5.3 IT tools<br>5.4 Computers with word processing application<br>5.5 Internet connection<br>5.6 Presentations<br>5.7 Learning manuals |
| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Written test<br>6.2 Demonstration<br>6.3 Oral questioning |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor. |

**Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

# Sector Specific Units of Competencies

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|---|---|
| **Unit Code and Title** | **SU-ICT-05-L3-V1: Comply to Ethical Standards in the ICT Workplace** |
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to comply to ethical standards in the ICT workplace. It specifically includes upholding the requirements of clients, delivering quality products and services, maintaining professionalism at workplace, and maintaining workplace code of conduct. |
| **Nominal Hours** | **15 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold and Underlined** terms are elaborated in the Range of Variables |
| 1. Uphold the requirements of clients | 1.1 Clients' requirements are identified.<br>1.2 Confidentiality of information is maintained in accordance with workplace policies / organizational policies/ national legislation.<br>1.3 Potential conflicts of interest are identified and involved parties of potential conflicts are notified.<br>1.4 Proprietary rights of client/customer is asserted. |
| 2. Deliver quality products and services | 2.1. Products and services are provided according to the clients' requirements.<br>2.2. Work is completed as per standards.<br>2.3. Quality processes are implemented when developing products and services. |
| 3. Maintain professionalism at workplace | 3.1 Work processes are delivered as per standards.<br>3.2 Skills, knowledge and qualifications are presented in a professional manner.<br>3.3 Services and products developed by self and others are delivered as per workplace standard.<br>3.4 Unbiased and objective information are provided to clients.<br>3.5 Realistic estimates for time, cost and delivery of outputs are presented during negotiation. |
| 4. Maintain workplace code of conduct. | 4.1 Workplace code of conduct are interpreted<br>4.2 Workplace code of conduct is followed. |
| **Range of variables** | |
| **Variables** | **Range** (may include but not limited to): |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency | |

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|---|---|
| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 asserted proprietary rights of client/customer.<br>1.2 completed work to industry and international standards.<br>1.3 implemented quality processes when developing products and services.<br>1.4 delivered services and products developed by self and others.<br>1.5 provided unbiased and objective information to clients.<br>1.6 followed workplace code of conduct. |
| 2. Underpinning knowledge | 2.1. Corporate code of confidentiality of information<br>2.2. organizational policies, national legislation and workplace policies in relation to IT sector<br>2.3. Law and regulations pertaining to proprietary rights<br>2.4. Quality processes for products and services<br>2.5. Procedure of provided to client information<br>2.6. Method of estimating for time, cost and delivery products and services<br>2.7. Workplace code of conduct in IT sector |
| 3. Underpinning Skills | 3.1. Upholding confidentiality of information in accordance with organizational policies, national legislation and workplace policies<br>3.2. Asserting proprietary rights of client/customer<br>3.3. Completing work in accordance with industry and international standards<br>3.4. Implementing quality processes when developing products and services<br>3.5. Delivering correctly services and products developed by self and others<br>3.6. Providing unbiased and objective information are to clients.<br>3.7. Presenting realistic estimates for time, cost and delivery of outputs during negotiation<br>3.8. Following workplace code of conduct |
| 4. Underpinning Attitudes | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace. |
| 5. Resource Implications | The following resources must be provided:<br>5.1 Relevant tools, Equipment, software and facilities needed to perform the activities.<br>5.2 Required learning materials. |

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| 6. Methods of Assessment | 6.1 Written Test<br>6.2 Demonstration<br>6.3 Oral Questioning |
| 7. Context of Assessment | 7.1. Competency assessment must be done in NSDA accredited center.<br>7.2. Assessment should be done by NSDA certified/ nominated assessor |

**Accreditation Requirements**

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# Occupation Specific Units of Competencies

| **Unit Code and Title** | **OU-ICT-AMAD-01-L3-V1: Work with Kotlin Basics** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required of a worker to work with Kotlin basics. It specifically includes the tasks of creating Kotlin data types and using Kotlin. |
| **Nominal Hours** | **40 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & underlined** terms are elaborated in the Range of Variables |
| 1. Create Kotlin data types | 1.1 Basic anatomy of a Kotlin program for android application is described.<br>1.2 **Kotlin variables** are presented.<br>1.3 Input and output syntax are applied<br>1.4 Conditional statement is explained.<br>1.5 Conditional loops are used.<br>1.6 Data types in Kotlin is created. |
| 2. Use Kotlin | 2.1. An application is created.<br>2.2. The **numbers** are seen in display.<br>2.3. Methods in Kotlin is implemented. |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |
| 1. Kotlin variables | 1.1 Integer<br>1.2 String<br>1.3 Double<br>1.4 Float |
| 2. Numbers | 2.1. List of number<br>2.2. Even number<br>2.3. Odd number |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency. | |
| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 created Kotlin data types<br>1.2 used Kotlin<br>1.3 implemented methods in Kotlin |
| 2. Underpinning knowledge | 2.1 Basic anatomy of a Kotlin program for android application<br>2.2 Kotlin variables<br>2.3 Conditional statement<br>2.4 Conditional loops<br>2.5 Data types in Kotlin<br>2.6 An application |

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| | 2.7 The numbers display.<br>2.8 Methods in Kotlin |
| 3. Underpinning skills | 3.1 Describing basic anatomy of a Kotlin program for android application<br>3.2 Presenting Kotlin variables<br>3.3 Explaining conditional statement<br>3.4 Using conditional loops<br>3.5 Creating data types in Kotlin<br>3.6 Creating an application<br>3.7 Displaying the numbers in display.<br>3.8 Implementing methods in Kotlin |
| 4. Underpinning attitude | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace |
| 5. Resource implications | The following resources must be provided:<br>5.1 Course materials<br>5.2 PowerPoint presentation<br>5.3 Laptop, projector<br>5.4 Internet connection |
| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Demonstration<br>6.2 Oral questioning<br>6.3 Written test<br>6.4 Portfolio |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor |

**Accreditation Requirements**

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| **Unit Code and Title** | **OU-ICT-AMAD-02-L4-V1: Work with OOP and Design Pattern** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required of a worker to work with OOP and design pattern. It specifically includes the tasks of describing class properties, constants & visibility, applying encapsulation, applying inheritance and using polymorphism and using design pattern. |
| **Nominal Hours** | **45 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & underlined** terms are elaborated in the Range of Variables |
| 1. Describe class properties, constants & visibility | 1.1 **Kotlin built-in methods** is explained.<br>1.2 Field, property and method inside a class are interpreted.<br>1.3 **Advantages** and **limitations** of OOP are described. |
| 2. Apply encapsulation | 2.1. Encapsulation is described.<br>2.2. Language mechanism is explained for restricting access to object component.<br>2.3. Language construction is explained which facilitates bundling of data.<br>2.4. **Association relationship** is defined.<br>2.5. Association relationship between two classes are created.<br>2.6. Data and its functionality is encapsulated. |
| 3. Apply inheritance | 3.1 The inheritance is explained.<br>3.2 Types of inheritance are identified.<br>3.3 Subclasses and super classes of inheritance are explained.<br>3.4 Essence of inheritance relationship is described.<br>3.5 Inheritance relationship between classes is created.<br>3.6 Inheritances vs sub typing is explained. |
| 4. Use Polymorphism | 4.1 Static Polymorphism is used.<br>4.2 Dynamic Polymorphism is applied. |
| 5. Use design pattern | 5.1. **Design pattern** categories is explained<br>5.2. Aspects of design is recognized<br>5.3. Design pattern is applied |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |
| 1. Kotlin Built-in Methods | 1.1 String Methods<br>1.2 Number Methods<br>1.3 Character Methods<br>1.4 Array Methods |

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| 2. Advantages | 2.1 Software reuse is enhanced.<br>2.2 Software maintenance cost can be reduced.<br>2.3 Data access is restricted providing better data security.<br>2.4 Software is easily developed for complex problems.<br>2.5 Software may be developed meeting the requirements on time, on the estimated budget.<br>2.6 Software has improved performance.<br>2.7 Software quality is improved.<br>2.8 Class hierarchies are helpful in the design process allowing increased extensibility.<br>2.9 Modularity is achieved.<br>2.10 Data abstraction is possible |
| 3. limitations | 3.1 lengthy process<br>3.2 Requires intensive testing procedures. |
| 4. Association relationship | 4.1 One-to-one<br>4.2 One-to-many |
| 5. Design pattern | 5.1 Singleton pattern<br>5.2 Builder pattern<br>5.3 Factory pattern |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency. | |
| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 described class properties, constants and visibility<br>1.2 described advantages and limitations of OOP<br>1.3 explained encapsulation<br>1.4 encapsulated data and its functionality<br>1.5 explained inheritance<br>1.6 used polymorphism |
| 2. Underpinning knowledge | 2.1 Magic Methods<br>2.2 Field, property and method inside a class<br>2.3 The different areas in making OOP<br>2.4 Advantages and limitations of OOP<br>2.5 Encapsulation<br>2.6 Language mechanism for restricting access to some of the object component.<br>2.7 Language construction that facilitates the bundling of data with the methods.<br>2.8 Association relationship<br>2.9 Association relationship between two classes<br>2.10 Data and its functionality<br>2.11 The inheritance<br>2.12 Types of inheritance<br>2.13 Subclasses and super classes of inheritance |

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| | 2.14 Essence of inheritance relationship<br>2.15 Inheritance relationship between classes<br>2.16 Inheritances vs sub typing<br>2.17 Static Polymorphism (compile time polymorphism/ Method overloading)<br>2.18 Dynamic Polymorphism (run time polymorphism/ Method Overriding). |
| 3. Underpinning skills | 3.1 Explaining PHP magic methods<br>3.2 Keeping field, property and method inside a class<br>3.3 Applying the different areas in making OOP<br>3.4 Describing advantages and limitations of OOP<br>3.5 Describing encapsulation<br>3.6 Explaining language mechanism for restricting access to some of the object component.<br>3.7 Explaining language construction that facilitates the bundling of data with the methods.<br>3.8 Defining association relationship<br>3.9 Creating association relationship between two classes<br>3.10 Encapsulating data and its functionality<br>3.11 Explaining the inheritance<br>3.12 Identifying types of inheritance<br>3.13 Explaining subclasses and super classes of inheritance<br>3.14 Describing essence of inheritance relationship<br>3.15 Creating inheritance relationship between classes<br>3.16 Explaining inheritances vs sub typing<br>3.17 Using static polymorphism<br>3.18 Applying dynamic polymorphism |
| 4. Underpinning attitude | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace |
| 5. Resource implications | The following resources must be provided:<br>5.1 Course materials<br>5.2 PowerPoint presentation<br>5.3 Software tools<br>5.4 Laptop, projector<br>5.5 Internet connection |

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| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Written test<br>6.2 Demonstration<br>6.3 Oral questioning<br>6.4 Portfolio |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor |
| **Accreditation Requirements**<br>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA. | |

| **Unit Code and Title** | **OU-ICT-AMAD-03-L4-V1: Work with Android Basic** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required of a worker to work with android basic. It specifically includes the tasks of deploying android platform, using main building blocks and creating android user interface. |
| **Nominal Hours** | **50 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & underlined** terms are elaborated in the Range of Variables |
| 1. Deploy android platform | 1.1 History of Apps Development is explained.<br>1.2 Overview of Android Apps development is described.<br>1.3 Computer is configured for setting up **android application development environment**.<br>1.4 Android Apps Development Environment in a computer is explained. |
| 2. Use main building blocks | 2.1. Main building block of Android apps is used.<br>2.2. Activity life cycle is used.<br>2.3. UI Widgets are used.<br>2.4. View and **Layout** are created |
| 3. Create android user interface | 3.1. Intents are created.<br>3.2. UI with fragments and action bar is designed.<br>3.3. A simple activity layout is designed for some basic user operation. |

| **Range of Variables** | |
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| **Variables** | **Range** (may include but not limited to): |
| 1. Android application development environment | 1.1 Android studio<br>1.2 SDK<br>1.3 NDK<br>1.4 Emulator |
| 2. layout | 2.1. Linear<br>2.2. Relative<br>2.3. Table<br>2.4. Frame<br>2.5. Constraint layout |

**Evidence Guide**

The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.

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| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 explained android apps development environment in a computer<br>1.2 defined main building block of android apps<br>1.3 described UI widgets<br>1.4 designed a simple activity layout or some basic user operation |
| 2. Underpinning knowledge | 2.1 History of APPS development<br>2.2 Overview of android APPS development<br>2.3 Computer configuration for setting up android application development environment<br>2.4 Android APPS development environment in a computer<br>2.5 Main building block of android APPS<br>2.6 Intents and service<br>2.7 Content providers, broadcast receivers and application context<br>2.8 Activity life cycle.<br>2.9 View and layout<br>2.10 Familiarization of UI widgets<br>2.11 Designing a simple activity layout |
| 3. Underpinning skills | 3.1 Describing overview of android APPS development<br>3.2 Configuring computer for setting up android application development environment<br>3.3 Explaining android APPS development environment in a computer<br>3.4 Defining main building block of android APPS<br>3.5 Explaining intents and service<br>3.6 Explaining content providers, broadcast receivers and application context<br>3.7 Defining activity life cycle<br>3.8 Describing view and layout<br>3.9 Familiarizing UI widgets<br>3.10 Designing a simple activity layout for some basic user operation<br>3.11 Designing UI with fragments and action bar |

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| 4. Underpinning attitude | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace |
| 5. Resource implications | The following resources must be provided:<br>5.1 Course materials<br>5.2 PowerPoint presentation<br>5.3 Laptop, projector<br>5.4 Internet facility |
| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Written test<br>6.2 Demonstration<br>6.3 Oral questioning<br>6.4 Portfolio |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor |

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| **Unit Code and Title** | **OU-ICT-AMAD-04-L3-V1: Manage Database** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required of a worker to manage database. It specifically includes the tasks of using of preferences & file system, working with basic database, operating SQLite Database, using lists and adapters and using content providers |
| **Nominal Hours** | **40 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & underlined** terms are elaborated in the Range of Variables |
| 1. Use of preferences & file system | 1.1 Basic concept of shared preferences and file system in android is explained.<br>1.2 Saving and getting data in shared preference is performed. |
| 2. Work with basic database | 2.1 Database is interpreted<br>2.2 Data type is defined<br>2.3 Table is created<br>2.4 **Data manipulation** is performed |
| 3. Operate SQLite Database | 3.1 SQLite and Database design is described.<br>3.2 Managing SQLite database is explained.<br>3.3 Table in SQLite is created.<br>3.4 CRUD operation in database is made.<br>3.5 **Data operation** from database using Android Applications made. |
| 4. Use lists and adapters | 4.1. List is created.<br>4.2. List is used.<br>4.3. Collection of items using list is used.<br>4.4. Working with list in Android is performed.<br>4.5. Custom list is created using adapter. |
| 5. Use content providers | 5.1. Method to create content provider is explained.<br>5.2. Content provider is used.<br>5.3. Data from one process to another is passed.<br>5.4. Database operation is simplified. |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |
| 1. Data manipulation | 1.1 CRUD<br>1.1.1 Create<br>1.1.2 Retrieve/read<br>1.1.3 Update<br>1.1.4 Delete<br>1.2 Join |

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| 2. Date operation | 2.1 Select<br>2.2 Save<br>2.3 Modify<br>2.4 Edit<br>2.5 Add<br>2.6 Insert()<br>2.7 Update()<br>2.8 Delete()<br>2.9 query() |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency. | |
| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 operated SQLite Database.<br>1.2 used content providers.<br>1.3 used lists and adapters.<br>1.4 demonstrated use of preferences and file system. |
| 2. Underpinning knowledge | 2.1 SQLite and Database design<br>2.2 Managing SQLite database<br>2.3 CRUD operation in database<br>2.4 Table in SQLite<br>2.5 Data queries<br>2.6 Data operation from database using Android Application<br>2.7 Method to create content provider.<br>2.8 Content provider<br>2.9 Data from one process to another<br>2.10 Database operation.<br>2.11 Collection of items using list<br>2.12 Working with list in Android<br>2.13 Custom list<br>2.14 Basic concept of shared preferences and file system in android<br>2.15 Saving and getting data in shared preference |
| 3. Underpinning skills | 3.1 Describing SQLite and database design<br>3.2 Explaining managing SQLite database<br>3.3 Making crud operation in database<br>3.4 Creating table in SQLite<br>3.5 Making data operation from database using android application<br>3.6 Explaining method to create content provider<br>3.7 Using content provider<br>3.8 Passing data from one process to another<br>3.9 Simplifying database operation |

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| | 3.10 Defining and using list<br>3.11 Demonstrating collection of items using list<br>3.12 Demonstrating working with list in android<br>3.13 Creating custom list using adapter<br>3.14 Explaining basic concept of shared preferences and file system in android<br>3.15 Demonstrating saving and getting data in shared preference |
| 4. Underpinning attitude | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace |
| 5. Resource implications | The following resources must be provided:<br>5.1 Course materials<br>5.2 PowerPoint presentation<br>5.3 Software tools<br>5.4 Laptop, projector<br>5.5 Internet connection |
| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Demonstration<br>6.2 Oral questioning<br>6.3 Written test<br>6.4 Portfolio |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor |

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| **Unit Code and Title** | **OU-ICT-AMAD-05-L4-V1: Perform Application Programming Interface integration** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required of a worker to perform application programming interface integration. It specifically includes the tasks of using API, implementing custom API, implementing firebase API and implementing Firebase Cloud Messaging (FCM) |
| **Nominal Hours** | **40 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & underlined** terms are elaborated in the Range of Variables |
| 1. Use API | 1.1 Application Programming Interface (API) is defined.<br>1.2 API is integrated |
| 2. Implement custom API | 2.1 Custom API is defined<br>2.2 Custom API is integrated |
| 3. Implement firebase API | 3.1 Firebase API is defined<br>3.2 Firebase API is integrated<br>3.3 Firebase authentication is performed<br>3.4 Firebase Realtime database is displayed |
| 4. Implement Firebase Cloud Messaging (FCM) | 4.1 FCM in Android is described.<br>4.2 Client and server in FCM is defined.<br>4.3 FCM client is implemented.<br>4.4 FCM server is implemented.<br>4.5 Working with user notification is demonstrated. |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency. | |
| 1. Critical aspects of competency | Assessment required Evidence that the candidate:<br>1.1 used Application Program Interface (API).<br>1.2 used switch on/off to display using proximity sensor.<br>1.3 explained HTTP and web services |
| 2. Underpinning knowledge | 2.1 Location API<br>2.2 Working with Map API<br>2.3 Telephony network information<br>2.4 Introduction to sensor<br>2.5 Users location |

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| | 2.6 Routes on Map<br>2.7 Switch on/off to display using proximity sensor<br>2.8 Web service<br>2.9 Json based web service<br>2.10 Open weather Map API and display weather information<br>2.11 FCM in Android is described<br>2.12 Client and server in FCM<br>2.13 FCM client<br>2.14 FCM server<br>2.15 Working with user notification |
| 3. Underpinning skills | 3.1 Describing location API<br>3.2 Explaining on how to work with map API<br>3.3 Finding users location<br>3.4 Drawing routes on map<br>3.5 Using switch on/off to display using proximity sensor<br>3.6 Defining Web service<br>3.7 Consuming open weather map API and display weather information |
| 4. Underpinning attitude | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace |
| 5. Resource implications | The following resources must be provided:<br>5.1 Course materials<br>5.2 PowerPoint presentation<br>5.3 Software tools<br>5.4 Laptop, projector<br>5.5 Internet connection |
| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Demonstration<br>6.2 Oral questioning<br>6.3 Written test<br>6.4 Portfolio |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor |

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| **Unit Code and Title** | **OU-ICT-AMAD-06-L4-V1: Implement Background Service and Application Deployment** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required of a worker to implement background service and application deployment. It specifically includes the tasks of implementing broadcast receivers, starting a service, performing Test Driven Development (TDD) and introducing application signing and deployment |
| **Nominal Hours** | **40 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & underlined** terms are elaborated in the Range of Variables |
| 1. Implement broadcast receivers | 1.1 Event receiving is explained.<br>1.2 An event is received.<br>1.3 A service is started using broadcast receiver. |
| 2. Start a service | 2.1. **Lifecycle of services** is explained.<br>2.2. Different types of services are implemented.<br>2.3. Notification using service is generated.<br>2.4. Music playing as a background service is made. |
| 3. Perform Test Driven Development (TDD) | 3.1 TDD is explained.<br>3.2 Unit testing is performed.<br>3.3 UI testing is performed. |
| 4. Introduce application signing and deployment | 4.1 Key store file to make signed APK is generated.<br>4.2 Google play console dashboard is used.<br>4.3 Application signing and deployment is introduced. |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |
| 1. Lifecycle of services | 1.1 On start command<br>1.2 On bind<br>1.3 On create<br>1.4 On destroy<br>1.5 Bind service<br>1.6 Stop self<br>1.7 Stop service |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency. | |

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| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 demonstrated starting a service by using broadcast receiver.<br>1.2 describe broadcast receivers<br>1.3 start a service<br>1.4 generated notification using service<br>1.5 introduced application signing and deployment |
| 2. Underpinning knowledge | 2.1 Event receiving<br>2.2 Starting a service by using broadcast receiver<br>2.3 Receiving techniques of an event<br>2.4 Lifecycle of services<br>2.5 Different types of services<br>2.6 Notification using service<br>2.7 Music playing as a background service<br>2.8 Key store file to make signed APK.<br>2.9 Application signing and deployment |
| 3. Underpinning skills | 3.1 Explaining event receiving<br>3.2 Demonstrating on how to start a service by using broadcast receiver<br>3.3 Receiving an event<br>3.4 Explaining lifecycle of services<br>3.5 Implementing different types of services<br>3.6 Generating notification using service<br>3.7 Making music playing as a background service<br>3.8 Generating key store file to make signed APK.<br>3.9 Introducing application signing and deployment |
| 4. Underpinning attitude | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace |
| 5. Resource implications | The following resources must be provided:<br>5.1 Course materials<br>5.2 PowerPoint presentation<br>5.3 Software tools<br>5.4 Laptop, projector<br>5.5 Internet connection |

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| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Demonstration<br>6.2 Oral questioning<br>6.3 Written test<br>6.4 Portfolio |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor |

**Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

| **Unit Code and Title** | **OU-ICT-AMAD-07-L4-V1: Perform Project Work with Android** |
|---|---|
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to perform project work with Android.<br>It specifically includes the tasks of interpreting project management basics, developing an application in Android, developing user story, performing unit testing, creating project presentation and developing awareness about rights |
| **Nominal Hours** | **40 Hours** |
| **Elements of Competency** | **Performance Criteria**<br>**Bold & underlined** terms are elaborated in the Range of Variables |
| 1. Interpret project management basics | 1.1 Concepts of project management is interpreted<br>1.2 Resource management is interpreted<br>1.3 Process management is interpreted<br>1.4 Technology management is interpreted<br>1.5 Team communication and reporting are acknowledged |
| 2. Develop an application in Android | 2.1. **Android Architecture Components** are identified<br>2.2. Project model is selected as per project requirement.<br>2.3. Key principles of selected model are implemented.<br>2.4. User interface of a mobile application is designed.<br>2.5. Git as a source control system is used.<br>2.6. Android application is developed. |
| 3. Develop user story | 3.1 User story is explained.<br>3.2 Story estimated.<br>3.3 User stories of a project work is defined.<br>3.4 **Project management tool** is used.<br>3.5 Project stories are made. |
| 4. Perform unit testing | 4.1. Test cases are identified<br>4.2. **Testing tools** are used |
| 5. Create project presentation | 5.1. Project **document** is created.<br>5.2. Final project presentation in a group and/or individual is created. |
| 6. Develop awareness about rights | 6.1 The policies, rules and regulations that govern the work and workplace are upheld.<br>6.2 Illegal conduct or illegitimate action is reported to appropriate management.<br>6.3 Propriety or confidential information is protected. |
| **Range of Variables** | |
| **Variables** | **Range** (may include but not limited to): |

| | |
|---|---|
| 1. Android Architecture Components | 1.1 Separation of Concern<br>1.2 MVVM Pattern<br>1.3 Lifecycle of a View Model<br>1.4 Live Data<br>1.5 Data Binding<br>1.6 Pagination |
| 2. Project management tool | 2.1 Jira<br>2.2 Trello<br>2.3 Asana<br>2.4 Azure DevOps<br>2.5 Github boards |
| 3. Testing tools | 3.1. JUnit<br>3.2. Mockito |
| 4. Document | 4.1 Analysis document<br>4.2 Design document<br>4.3 Implementation document<br>4.4 Testing document<br>4.5 Deployment document<br>4.6 Maintenance and support document<br>4.7 User manual |
| **Evidence Guide**<br>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency. | |
| 1. Critical aspects of competency | Assessment required evidence that the candidate:<br>1.1 developed an application in android<br>1.2 developed user story<br>1.3 performed unit testing<br>1.4 created project presentation<br>1.5 developed awareness about rights |
| 2. Underpinning knowledge | 2.1 The user story<br>2.2 Define user stories definitions of project work<br>2.3 Policies, rules/regulations that govern the work and workplace.<br>2.4 Procedure of reporting illegal conduct or illegitimate action to appropriate management. |
| 3. Underpinning skills | 3.1 Developing a Native Android Application with Kotlin in Android Studio<br>3.2 Implementing Android Architecture Components<br>3.3 Estimating a story<br>3.4 Assigning a card to a group member<br>3.5 Working with project stories<br>3.6 Creating a project document<br>3.7 Making a final project presentation in a group and/or individual. |

| | |
|---|---|
| | 3.8 Protecting propriety or confidential information. |
| 4. Underpinning attitude | 4.1 Commitment to occupational health and safety<br>4.2 Promptness in carrying out activities<br>4.3 Sincere and honest to duties<br>4.4 Environmental concerns<br>4.5 Eagerness to learn<br>4.6 Tidiness and timeliness<br>4.7 Respect for rights of peers and seniors in workplace<br>4.8 Communication with peers and seniors in workplace |
| 5. Resource implications | The following resources must be provided:<br>5.1 Course materials<br>5.2 Laptop, projector<br>5.3 Internet connection |
| 6. Methods of assessment | Methods of assessment may include but not limited to:<br>6.1 Demonstration<br>6.2 Oral questioning<br>6.3 Written test<br>6.4 Portfolio |
| 7. Context of assessment | 7.1 Competency assessment must be done in NSDA accredited center.<br>7.2 Assessment should be done by NSDA certified/ nominated assessor |
| **Accreditation Requirements**<br>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA. | |

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**Development of Competency Standard**

The Competency Standards for National Skills Certificate in Android Mobile Application Development, Level-4 is developed by SEIP on 20th March 2016.

**List of Members**

| S/N | Name and Address | Position in the committee |
|---|---|---|
| 1. | Mr. Md. Mokhlesur Rahman, CEO, SPONDON | Member |
| 2. | Mr. MdFaruk Hossain, Team Leader, Graphic Design, Bording Vista Ltd. | Member |
| 3. | Mrs. Sayma Begum, Asst. Trainer, BITM | Member |
| 4. | Mr. ZohirulAlamTiemoon, CEO, Nerd Castle, Ltd | Member |
| 5. | Mr. Tayabur Rahman Masud, Asst. Trainer, BITM | Member |
| 6. | Mr. Mian Zadid Rusdid, Lead Trainer, BITM | Member |
| 7. | Mr. Khondoker Ali Asgor Pavel, CEO, BitBirds Solution | Member |
| 8. | Md. Hasib, Executive, IT, BITM | Member |
| 9. | Sifat-E-Tanzim, Software Engineer, Liveoutsource,Ltd. | Member |

## Validation of Competency Standard

The Competency Standards for National Skills Certificate in Android Mobile Application Development, Level-4 is validated by NSDA on 07 September 2022.

**List of Members of the SCVC**

| S/N | Name and Address | Position in the committee | Signature and Date |
|---|---|---|---|
| 1. | Shafquat Haider, Chairman, ICT ISC, ciproco@bol-online.com, shafquat.haider@gmail.com, Mobile No. 01711532597 | Chairperson | |
| 2. | Istiaque Ahmed, Managing Director, Battery Low Interactive Ltd., Email: istiaque.batterylowinteractive@gmail.com, Mobile: 01675-266527 | Member | |
| 3. | Ruhul Amin, App Developer, Battery Low Interactive Ltd., Email: ruhul.batterylowinteractive@gmail.com, Mobile: 01744954154 | Member | |
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