



**NATIONAL COMPETENCY STANDARDS
FOR
CYBER SECURITY TECHNOLOGIST
(ND2)**

**Department of Occupational Standards
Ministry of Labour and Human Resources
Thimphu, Bhutan.
July 2022**



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FOREWORD

The Department of Occupational Standards of the Ministry of Labour and Human Resources proudly presents National Competency Standards (NCS) for Cyber Security Technologist as part of TVET reform initiative for improving the quality of Vocational Education and Training System in Bhutan. The standards represent the fruits of hard work and invaluable experiences gained by the department since its establishment in the latter half of 2003. The main aim of developing Competency Standards is to set up a well defined nationally recognized Vocational Qualification and Certification system that will help set a benchmark for the Technical Vocational Education and Training (VET) System in our country aligned to international best practices.

National Competency Standards is one of the base pillars in the Bhutan Vocational Qualification Framework (BVQF) and is the first step in its implementation. The standards are developed to ensure that employees or vocational graduates possess and acquire the desired skills, knowledge and attitude required by industries and employers. In order to ensure this close match in supply and demand of skills, knowledge and attitude, standards have been developed in close consultation and partnership with industry experts and validated by the Technical Advisory Committees for the concerned economic sectors.

A vocational education and training system based on National Competency Standards shall ensure that delivered training is of a high quality and relevant to the needs of the labour market. As a result, future TVET graduates will be better equipped to meet the need and expectations of industries and employers. This positive impact on the employability of TVET graduates will enhance the reputation of vocational education and training and make it attractive to school leavers.

While acknowledging the existing level of cooperation and collaboration, the ministry earnestly requests employers and training providers to extend the fullest support and cooperation in implementing the Standards. The ultimate objective is to build a competent and productive national workforce that will contribute to the continued socio-economic progress of our country.

I gratefully acknowledge the valuable contributions made by experts from industries during the consultation, verification and validation processes of the

standards. I look forward to improved engagement and active participation of the industry and employers in the development of a quality assured demand driven TVET system in the near future.

Director
Department of Occupational Standards
Ministry of Labour and Human Resources

Acknowledgement

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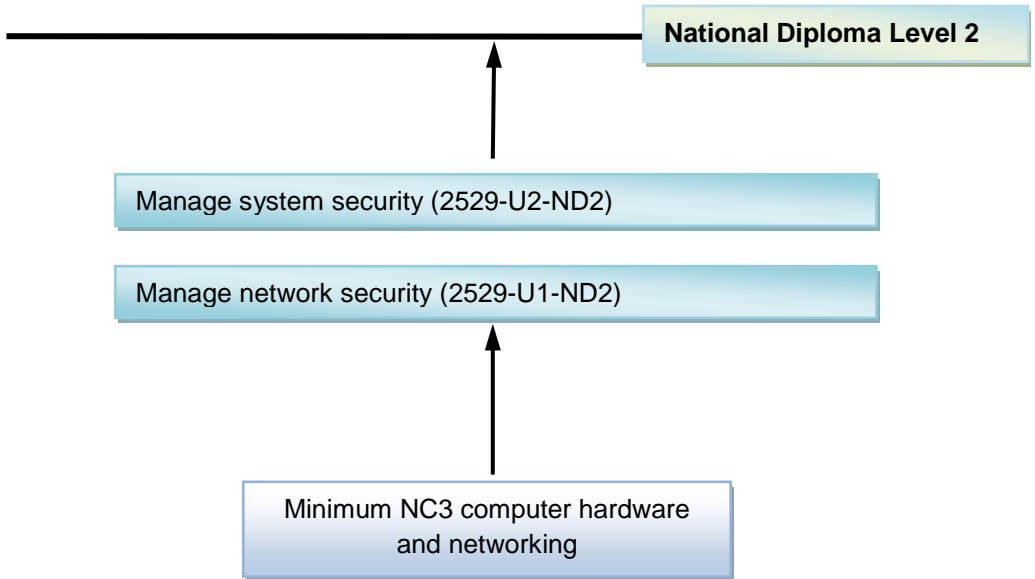
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PACKAGING OF QUALIFICATIONS



OVERVIEW OF NATIONAL COMPETENCY STANDARDS

| UNIT TITLE | ELEMENTS OF COMPETENCE |
|-------------------------|--|
| Manage network security | <ol style="list-style-type: none"><li>1. Perform network security need assessment<li>2. Apply network security services<li>3. Manage and monitor network |
| Manage system security | <ol style="list-style-type: none"><li>1. Determine anomalies in the system<li>2. Manage system access and controls<li>3. Perform application and web security<li>4. Maintain information security |

| | |
|---|--|
| UNIT TITLE : | Manage Network Security |
| DESCRIPTOR: | This unit covers the competencies required to perform network security need assessment, apply network security services and manage and monitor network security. |
| CODE : | 2529-U1-ND2 |
| ELEMENTS OF COMPETENCE | PERFORMANCE CRITERIA |
| 1. Perform network security need assessment | <p>1.1 Identify the organizational network infrastructures and end user devices following standard procedures</p> <p>1.2 Discover and manage organization's ICT assets following standard procedures</p> <p>1.3 Perform security assessment in the organization's network following standard procedures</p> <p>1.4 Produce security assessment report following standard procedures</p> <p>1.5 Analyze the report to determine network security requirements following standard procedures</p> |
| 2. Apply network security services | <p>2.1 Install and configure network security services following standard procedures</p> <p>2.2 Write firewall policy, intrusion and detection rules following standard procedures</p> <p>2.3 Troubleshoot the network security services following standard procedures</p> <p>2.4 Deploy network security services in an organization following standard procedures</p> |
| 3. Manage and monitor network | <p>3.1 Identify the network monitoring tools following standard procedures</p> <p>3.2 Install, configure and maintain network monitoring tools following standard procedures</p> <p>3.3 Monitor and analyze the networks following standard procedures</p> <p>3.4 Report and mitigate network security incidents following standard procedures</p> |

| RANGE STATEMENT | |
|--|--|
| Network security services may include but not limited to: | |
| <ul style="list-style-type: none"> • Firewall • VLAN • VPN • IDPS | <ul style="list-style-type: none"> • DNSSEC • TLS • email security • SSH |
| Monitoring tools may include but not limited to: | |
| <ul style="list-style-type: none"> • LibreNMS | <ul style="list-style-type: none"> • Wireshark |
| Networks may include but not limited to: | |
| <ul style="list-style-type: none"> • Infrastructure | <ul style="list-style-type: none"> • Traffic |
| Critical Aspects : | |
| <ul style="list-style-type: none"> • Demonstrate compliance with occupational health and safety regulations applicable to worksite operation • Install, configure and maintain network security services following standard procedures | |

| UNDERPINNING KNOWLEDGE | UNDERPINNING SKILLS |
|--|--|
| <ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety (OHS) Regulations • Definition and Terminologies on Network security • Security concepts and its principles • Basic concepts of cloud security • Basic concepts of Cryptography | <ul style="list-style-type: none"> • Team work • Communication • Problem solving • Interpersonal relationship • Creativity • Time Management |

| | |
|---|--|
| <ul style="list-style-type: none">• Network Security Hardening• Security risk management• Threats and vulnerabilities• Types of cyber-attacks and crimes• Intellectual Property rights• Relevant rules and regulations related to cyber security | |
|---|--|

| | |
|---|--|
| UNIT TITLE : | Manage System Security |
| DESCRIPTOR: | This unit covers the competencies required to determine anomalies, manage system access and controls, perform application and web security and maintain information security following safety at all times. |
| CODE : | 2529-U2-ND2 |
| ELEMENTS OF COMPETENCE | PERFORMANCE CRITERIA |
| 1. Determine anomalies in the system | <p>1.1 Identify different system log files following standard procedure.</p> <p>1.2 Analyze the system logs to determine the anomalies following standard procedures</p> <p>1.3 Mitigate and report the system incidents following standard procedures</p> <p>1.4 Perform operating system hardening following standard procedures</p> |
| 2. Manage system access and controls | <p>2.1 Perform users and groups management following standard procedures</p> <p>2.2 Grant user privileges and access controls to the systems and files following standard procedures</p> <p>2.3 Perform different types of system control following standard procedures</p> |
| 3. Perform application and web security | <p>3.1 Identify application related threats and vulnerabilities following standard procedures</p> <p>3.2 Conduct web security testing using Open Web Application Security Project (OWASP) following standard procedures</p> <p>3.3 Apply different counter measures following standard procedures</p> <p>3.4 Perform software hardening following standard procedures</p> <p>3.5 Perform vulnerability and patch management</p> |

| | |
|----------------------------------|--|
| | following standard procedures |
| 4. Maintain information security | <p>4.1 Maintain data confidentiality using Encipherment tools following standard procedures</p> <p>4.2 Maintain data integrity using checksum tools following standard procedures</p> <p>4.3 Maintain data privacy using Encipherment and Access Control List following standard procedures</p> <p>4.4 Perform data backup and recovery following standard procedures</p> <p>4.5 Perform information classification following standard procedures</p> |

| RANGE STATEMENT | |
|--|--|
| Different system log files may include but not limited to: | |
| <ul style="list-style-type: none"> • Message log • Syslog • Events log | <ul style="list-style-type: none"> • Mail log • View Log |
| Types of system control may include but not limited to: | |
| <ul style="list-style-type: none"> • Mandatory access control • Discretionary access control | <ul style="list-style-type: none"> • Role-based access control |
| Threats may include but not limited to | |
| <ul style="list-style-type: none"> • Unauthorized access • Malware | <ul style="list-style-type: none"> • Alteration |
| Web security testing may include but not limited to | |
| <ul style="list-style-type: none"> • Static • Dynamic | <ul style="list-style-type: none"> • Penetration testing |
| Different counter measures may include but not limited to | |
| <ul style="list-style-type: none"> • Authentication • Authorization | <ul style="list-style-type: none"> • Encryption |

| | |
|---|---|
| Data confidentiality may include but not limited to | |
| <ul style="list-style-type: none"> Email encryption | <ul style="list-style-type: none"> SSL certificate |
| Critical Aspects : | |
| <ul style="list-style-type: none"> Demonstrate compliance with occupational health and safety regulations applicable to worksite operation. Grant user privileges and access controls to the systems and files following standard procedures Perform different types of system control following standard procedures | |

| UNDERPINNING KNOWLEDGE | UNDERPINNING SKILLS |
|--|--|
| <ul style="list-style-type: none"> Ethics and Integrity Occupational Health and Safety (OHS) Regulations Cryptography (Encryption and decryption, Hash functions) File system Basic digital forensics Social Engineering Device management Emerging technology security User authentication , authorization and accounting Types of Operating System Operating System hardening General Data Protection Regulation (GDPR) and other relevant regulations | <ul style="list-style-type: none"> Team work Communication Problem solving Interpersonal relationship Creativity Time Management |

Annexure

1.1 National Competency Standards (NCS)

The National Competency Standards specify the skill, knowledge and attitudes applied to a particular occupation. Standards also specify the standards or criteria of performance of a competent worker and the various contexts in which work may take place. Standards provide explicit advice to assessors regarding the skill and knowledge to be demonstrated by candidates seeking formal recognition either following training or through work experience.

1.2 Purpose of National Competency Standards

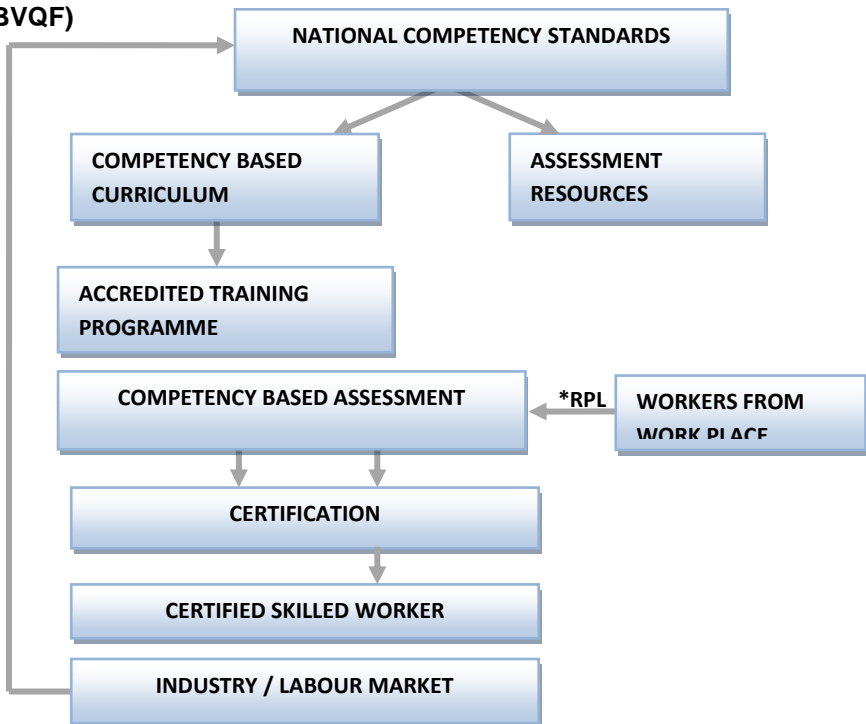
National Competency Standards serve a number of purposes including:

- Providing advice to curriculum developers about the competencies to be included in curriculum.
- Providing specifications to assessment resource developers about the competencies within an occupation to be demonstrated by candidates.
- Providing advice to industry/employers about job functions, which in turn can be used for the development of job descriptions, performance appraisal systems and work flow analysis.

1.3 Bhutan Vocational Qualifications Framework (BVQF)

Bhutan Vocational Qualifications Framework is an agreed system of Assessing, Certifying and Monitoring nationally recognized qualifications for all learning in the TVET sector against national competency standards, in training institutions, in the workplace, in schools or anywhere where learning takes place.

1.4 Components of the Bhutan Vocational Qualifications Framework (BVQF)



* RPL = Recognition of Prior Learning

1.5 BVQF Levels

The Bhutan Vocational Qualifications Framework has three levels classified based on the competency of the skilled workers. The three levels are:

- National Certificate Level 3 (NC III)
- National Certificate Level 2 (NC II)
- National Certificate Level 1 (NC I)

BVQF Level Descriptors

The qualification levels are decided based on level descriptors. The detail of the qualification level descriptor is as follows:

National Certificate Level 1

| Carry out processes that: | Learning demand: | Responsibilities which are applied: |
|--|--|--|
| <ul style="list-style-type: none">• Are narrow in range.• Are established and familiar.• Offer a clear choice of routine responses.• Involve some prioritizing of tasks from known solutions. | <ul style="list-style-type: none">• Basic operational knowledge and skill.• Utilization of basic available information.• Known solutions to familiar problems.• Little generation of new ideas. | <ul style="list-style-type: none">• In directed activity.• Under general supervision and quality control.• With some responsibility for quantity and quality.• With no responsibility for guiding others. |

National Certificate Level 2

| Carry out processes that: | Learning demand: | Responsibilities which are applied: |
|---|--|---|
| <ul style="list-style-type: none"> • Require a range of well-developed skills. • Offer a significant choice of procedures requiring prioritization. • Are employed within a range of familiar context. | <ul style="list-style-type: none"> • Some relevant theoretical knowledge. • Interpretation of available information. • Discretion and judgments. • A range of known responses to familiar problems | <ul style="list-style-type: none"> • In directed activity with some autonomy. • Under general supervision and quality checking. • With significant responsibility for the quantity and quality of output. • With some possible responsibility for the output of others. |

National Certificate Level 3

| Carry out processes that: | Learning demand: | Responsibilities which are applied: |
|---|---|--|
| <ul style="list-style-type: none"> • Requires a wide range of technical or scholastic skills. • Offer a considerable choice of procedures requiring prioritization to achieve optimum outcomes. • Are employed in a variety of familiar and unfamiliar contexts. | <ul style="list-style-type: none"> • A broad knowledge base which incorporates some theoretical concepts. • Analytical interpretation of information. • Informed judgment. • A range of sometimes innovative responses to concrete but often unfamiliar problems. | <ul style="list-style-type: none"> • In self-directed activity. • Under broad guidance and evaluation. • With complete responsibility for quantity and quality of output. • With possible responsibility for the output of others. |

1.6 PURPOSE

This qualification is designed for people interested in a career as a Fashion Designer at the Certificate level. It comprises of two units that cover the essential knowledge and skills required at workplace.

It provides industry specific skills and demands a level of performance that will enable new recruits to the industry to be immediately productive.

1.7 CODING USED FOR NATIONAL COMPETENCY STANDARDS

The coding and classification system developed in Bhutan is logical, easy to use, and also aligned with international best practises. The Bhutanese coding and classification system is based on the International Standard Classification of Occupations, 2008 (ISCO-08) developed by the International Labour Organisation (ILO).

The coding of the National competency standards forms the basis of the identification code for the Vocational Education and Training Management Information System (VET – MIS) both in terms of economic sector identification and that of the individual standard.

Coding the individual national competency standards

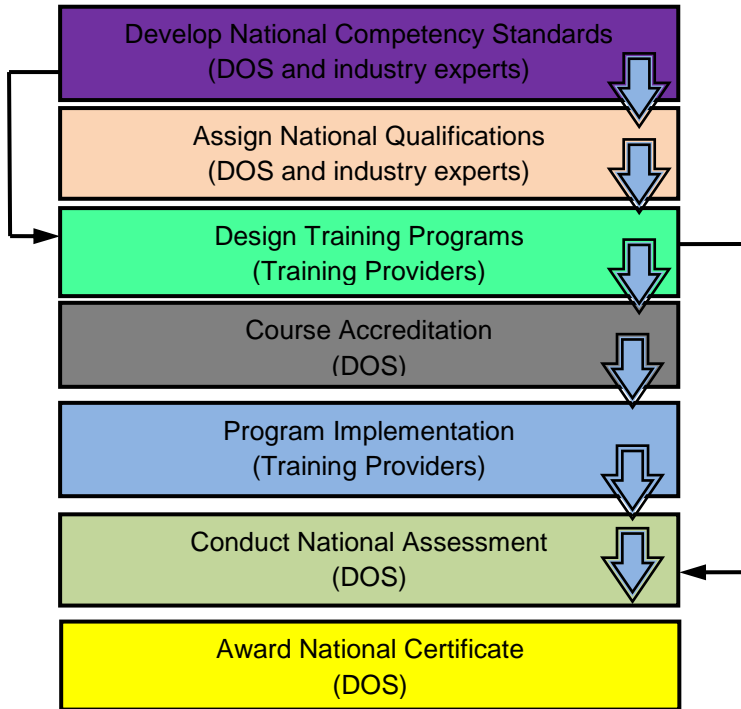
Coding the individual skills standard has a multiple purpose:

- to identify the level,
- to identify to which module the standard belongs,
- to identify in which order the standard is clustered within that module.

A job can include a number of competencies described in the national competency standards.

However, in order to follow a logical order, only national competency standards related to each other and following a logical sequence in terms of training delivery, from the simple to the complex, are clustered into a module. Some standards are so complex that they need to stand alone.

Implementation and operational procedures for National Competency Standards (NCS)



Key:

MoLHR – Ministry of Labour and Human Resources

DOS – Department of Occupational Standards

1.8 ASSESSMENT GUIDE

Form of assessments

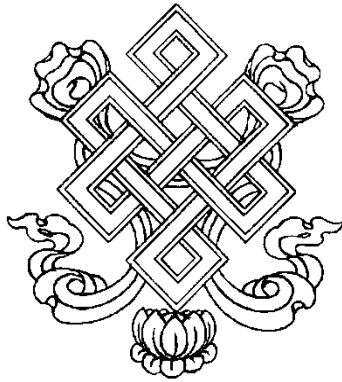
- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through diagrams, in writing or orally (viva-voce).

Assessment context

- Competency may be assessed in the actual work place or in a simulated workplace setting.

Assessment condition

- The candidate shall have access to all required tools, equipments, materials and documents.
- Candidate must complete the assessment in industry accepted time frame.



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