NATIONAL COMPETENCY STANDARDS
FOR
INFORMATION TECHNOLOGIST
(ND2)

Department of Occupational Standards
Ministry of Labour and Human Resources
Thimphu, Bhutan.
Sept. 2021

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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 Information 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

PACKAGING OF QUALIFICATIONS

National Diploma Level 2

Manage IT projects (2512-U4-ND2)

Manage database (2512-U3-ND2)

Develop software (2512-U2-ND2)

Manage network administration (2512-U1-ND2)

NC3 in relevant course or class 12
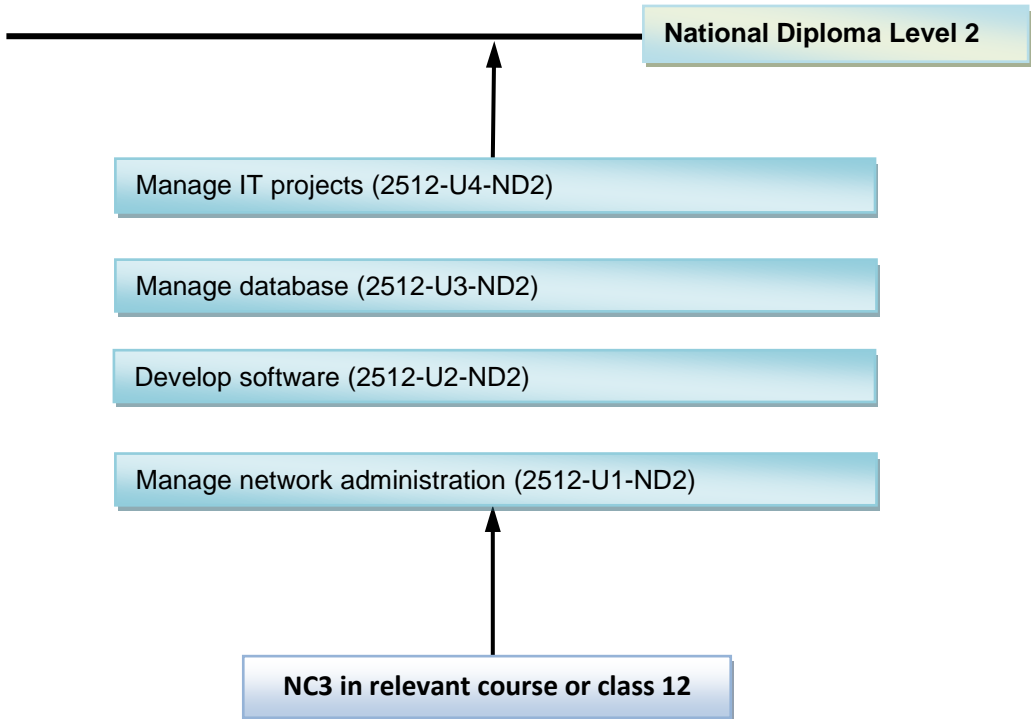
OVERVIEW OF NATIONAL COMPETENCY STANDARDS

UNIT TITLE	ELEMENTS OF COMPETENCE
Manage network administration	1. Design network 2. Configure network 3. Perform network security
Develop software	1. Prepare for software development 2. Design user interface 3. Perform Coding 4. Perform software testing and deployment
Manage database	1. Design database 2. Perform normalization 3. Perform database maintenance
Manage IT projects	1. Plan IT Project 2. Monitor and evaluate IT Project

UNIT TITLE :	Manage network administration
DESCRIPTOR:	This unit covers the competencies required to design, configure and perform network security following safety at all times.
CODE :	2512-U1-ND2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Design network	1.1 Determine the network topology as per the geographical location and customer's requirement 1.2 Assess **network requirements** as per the job requirement 1.3 Finalize the **network design** as per the job requirement
2. Configure network	2.1 Determine IP addressing schemes as per the job requirement 2.2 Determine network **Operating System** as per the job requirement 2.3 Configure **servers** as per the job requirement 2.4 Configure switches and routers following standard procedures 2.5 Perform network troubleshooting as per the standard procedures
3. Perform network security	3.1 Assess **network threats** as per the standard procedures 3.2 Assess network vulnerabilities as per the standard procedures 3.3 Determine the **network security devices** as per the standard procedures 3.4 Install and configure security devices as per the standard procedures 3.5 Perform network security troubleshooting as per the standard procedures

RANGE STATEMENT	
Network requirements may include but not limited to:	
• Routers • Switches	• Servers
Network design may include but not limited to:	
• Logical	• Physical
Operating system may include but not limited to:	
• Linux	• Windows
Servers may include but not limited to:	
• DNS • Web Server	• Mail server
Network threats may include but not limited to:	
• Virus • Spyware	• Malware
Network security devices may include but not limited to:	
• Intrusion detection system,	• Firewall
Critical Aspects :	
• Demonstrate compliance with occupational health and safety regulations applicable to worksite operation. • Design network as per the job requirement • Assessment of security threats and vulnerabilities as per the job requirement	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
• Ethics and Integrity	• Team work
• Occupational Health and Safety (OHS) Regulations	• Communication
• Types of network	• Problem solving
• Basic network security	• Interpersonal relationship
• Network operating system	• Creativity
• E-waste management	• Time Management
• Relevant rules and regulations	

UNIT TITLE :	Develop software
DESCRIPTOR:	This unit covers the competencies required to set up environment, design user interface and perform coding, testing and deployment following safety at all times.
CODE :	2512-U2-ND2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Prepare for software development	1.1 Gather requirements as per the job requirement following standard procedures 1.2 Analyze the requirement as per the job requirement following standard procedures 1.3 Develop Software Requirements Specification (SRS) document following standard procedures
2. Design user interface	2.1 Prepare data flow diagram as per the standard procedures 2.2 Design algorithm and process flow chart as per the job requirement 2.3 Prepare prototype of the interface as per the standard procedures
3. Perform Coding	3.1 Determine the ***programing language /framework*** as per the job requirement 3.2 Set up development of environment as per the job requirement 3.3 Install drivers and dependencies as per the job requirement 3.4 Execute coding as per the job requirement
4. Perform software testing and deployment	4.1 Review the developed software as per the job requirement 4.2 Test the software and rectify as per the job requirement 4.3 Deploy the software as per the job requirement

RANGE STATEMENT	
Programming language/framework may include but not limited to:	
• JAVA • PHP	• Python
Critical Aspects :	
• Demonstrate compliance with occupational health and safety regulations applicable to worksite operation. • Develop Software Requirements Specification (SRS) document following standard procedures	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
• Ethics and Integrity • Occupational Health and Safety (OHS) Regulations • Types of system security • Types of programming languages • Coding standards • E-waste management • Relevant rules and regulations	• Team work • Communication • Problem solving • Interpersonal relationship • Creativity • Time Management

UNIT TITLE :	**Manage database**
DESCRIPTOR:	This unit covers the competencies required to design database, perform normalization and database maintenance following safety procedures at all times.
CODE :	2512-U3-ND2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Design database	1.1 Design entity-relationship(ER) diagram as per the standard procedures
	1.2 Design the database tables as per the job requirement
	1.3 Index the tables as per the standard procedures
2. Perform normalization	2.1 Apply normalization rules as per the standard procedures
	2.2 Perform normalization test as per the standard procedures
3. Perform database maintenance	3.1 Execute database manipulation as per the standard procedures
	3.2 Execute backup and restore as per the standard procedures
	3.3 Perform Create, Read, Update and Delete(CRUD) operations as per the standard procedures
	3.4 Perform data migration as per the job requirement

RANGE STATEMENT
Critical Aspects :
• Demonstrate compliance with occupational health and safety regulations applicable to worksite operation.
• Design entity-relationship(ER) diagram as per the standard procedures
• Apply normalization rules as per the standard procedures
• Execute backup and restore as per the standard procedures

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
• Ethics and Integrity	• Team work
• Occupational Health and Safety (OHS) Regulations	• Communication
• Types of normalization	• Problem solving
• Types of database	• Interpersonal relationship
• Relevant rules and regulations	• Creativity
	• Time Management

UNIT TITLE :	Manage IT Projects
DESCRIPTOR:	This unit covers the competencies required to plan, monitor and evaluate IT projects following safety procedures at all times.
CODE :	2512-U4-ND2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Plan IT Project	1.1 Prepare work plan as per the job requirement 1.2 Prepare financial plan as per the job requirement 1.3 Prepare human resources plan as per the job requirement 1.4 Prepare material plan as per the job requirement 1.5 Prepare inception report as per the standard procedures
2. Monitor and Evaluate IT Project	2.1 Apply ***project management tools*** as per the job requirement 2.2 Review and update project plan as per the job requirement 2.3 Prepare periodic project report as per the standard procedures 2.4 Evaluate the project as per the standard procedures 2.5 Prepare project completion report as per the standard procedures

RANGE STATEMENT	
Project Management tools may include but not limited to:	
• GIThub	• BITbucket

Critical Aspects :

- Demonstrate compliance with occupational health and safety regulations applicable to worksite operation
- Prepare project plan as per the job requirement

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
• Ethics and Integrity	• Team work
• Occupational Health and Safety (OHS) Regulations	• Communication
• Project planning	• Problem solving
• Monitoring and evaluation of projects	• Interpersonal relationship
• Relevant rules and regulations	• Creativity
	• Time Management

Annexure

1.1National 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)

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          │   │  CURRICULUM          │  │   RESOURCES          │
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          │   │  ACCREDITED TRAINING │
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          │   ┌──────────────────────────┐  *RPL ┌──────────────────┐
          │   │ COMPETENCY BASED          │◀──────│ WORKERS FROM     │
          │   │ ASSESSMENT                │       │ WORK PLACE       │
          │   └──────────────────────────┘       └──────────────────┘
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          │   │     CERTIFICATION         │
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          │   │  CERTIFIED SKILLED WORKER │
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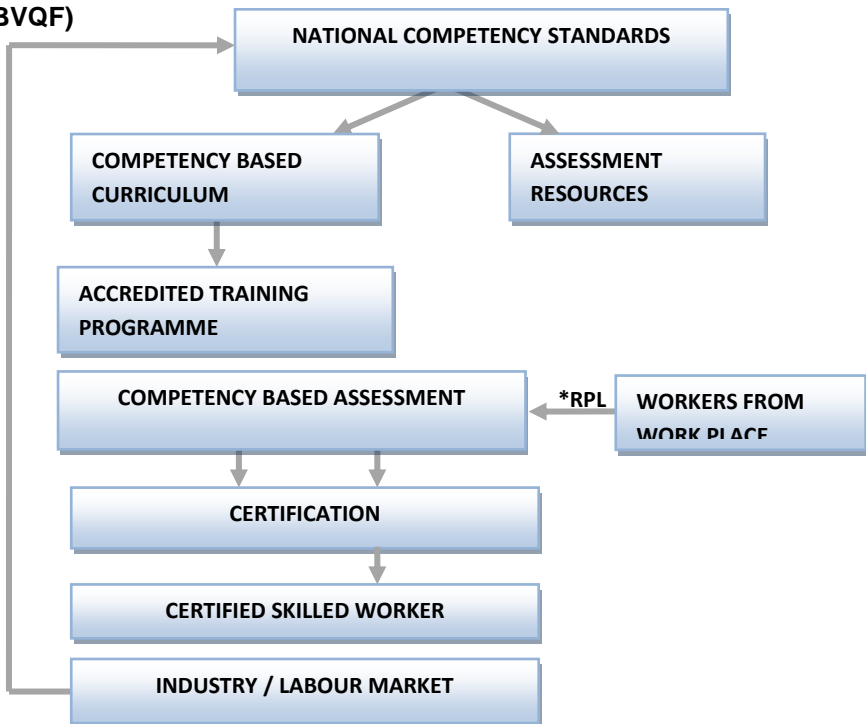
* RPL = Recognition of Prior Learning

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:
• Are narrow in range. • Are established and familiar. • Offer a clear choice of routine responses. • Involve some prioritizing of tasks from known solutions.	• Basic operational knowledge and skill. • Utilization of basic available information. • Known solutions to familiar problems. • Little generation of new ideas.	• 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:
• Require a range of well-developed skills. • Offer a significant choice of procedures requiring prioritization. • Are employed within a range of familiar context.	• Some relevant theoretical knowledge. • Interpretation of available information. • Discretion and judgments. • A range of known responses to familiar problems	• 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:
• 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.	• 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.	• 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.

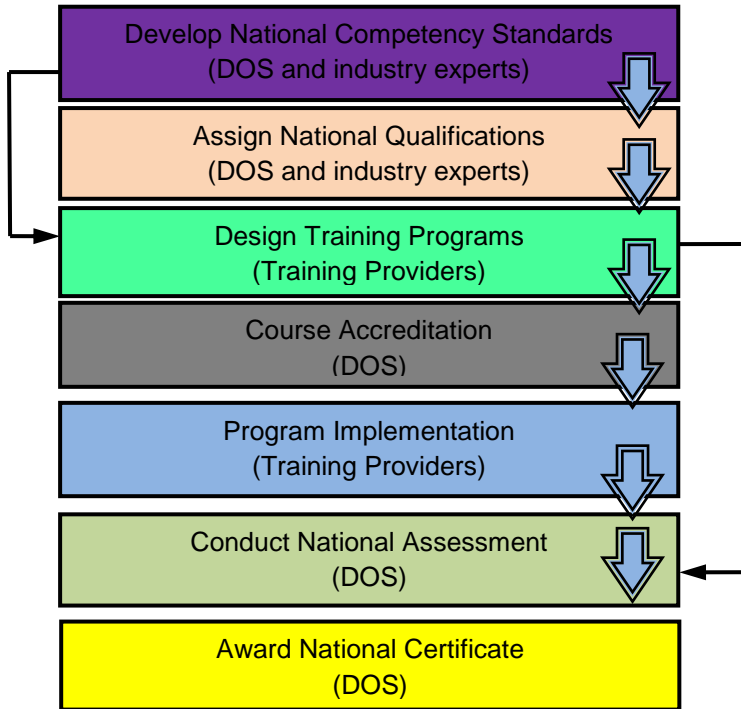**Coding the individual national competency standards**

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)

Develop National Competency Standards
(DOS and industry experts)

Assign National Qualifications
(DOS and industry experts)

Design Training Programs
(Training Providers)

Course Accreditation
(DOS)

Program Implementation
(Training Providers)

Conduct National Assessment
(DOS)

Award National Certificate
(DOS)

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.
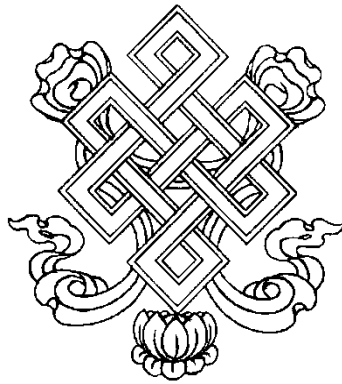
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