



**NATIONAL COMPETENCY STANDARDS
FOR
INFORMATION TECHNOLOGIST
(DIPLOMA)**

**INFORMATION AND COMMUNICATIONS
TECHNOLOGY SECTOR**



**TECHNICAL & VOCATIONAL EDUCATION AND
TRAINING (TVET) QUALITY COUNCIL
BHUTAN QUALIFICATIONS AND PROFESSIONALS
CERTIFICATION AUTHORITY
THIMPHU, BHUTAN
MARCH 2025**

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FOREWORD

The TVET Quality Council, BQPCA is pleased to present the National Competency Standards (NCS) for **Information Technologist (Diploma)** which is developed in consultation with the field experts and trainers. The main objective of developing National Competency Standards is to set up a well-defined nationally recognized TVET Qualifications that will help in setting a benchmark for the TVET Qualifications in our country aligned to the international best practices.

The standards are developed to ensure that the TVET trainees possess the desired Skills, Knowledge and Attitude required by the industries. In order to ensure the relevancy of the competencies, the standards are developed in close consultation and partnership with industry experts and trainers from training institutes.

A training system based on National Competency Standards shall ensure that the training is relevant to the needs of the labour market. As a result, future TVET trainees will be better skilled to meet the needs and expectations of industries and employers. Such a positive impact on the employability of TVET graduates will enhance the reputation of the TVET system and make it attractive to the youths.

While acknowledging the existing level of cooperation and collaboration, the Council earnestly requests employers and

training providers to extend the fullest support and cooperation in development and implementation of the National Competency Standards. The ultimate objective is to build a competent and productive national workforce that will contribute to the socio-economic development of our country. We gratefully acknowledge the valuable contributions made by experts from industries and trainers during the consultation and validation processes of the NCS development. We further look forward to improved industry engagement and active participation of trainers in the development of a quality-assured demand driven TVET system.

Director
BQPCA

ACKNOWLEDGEMENT

Date of Validation :12th March 2025

Next date of Revision :11th March 2030

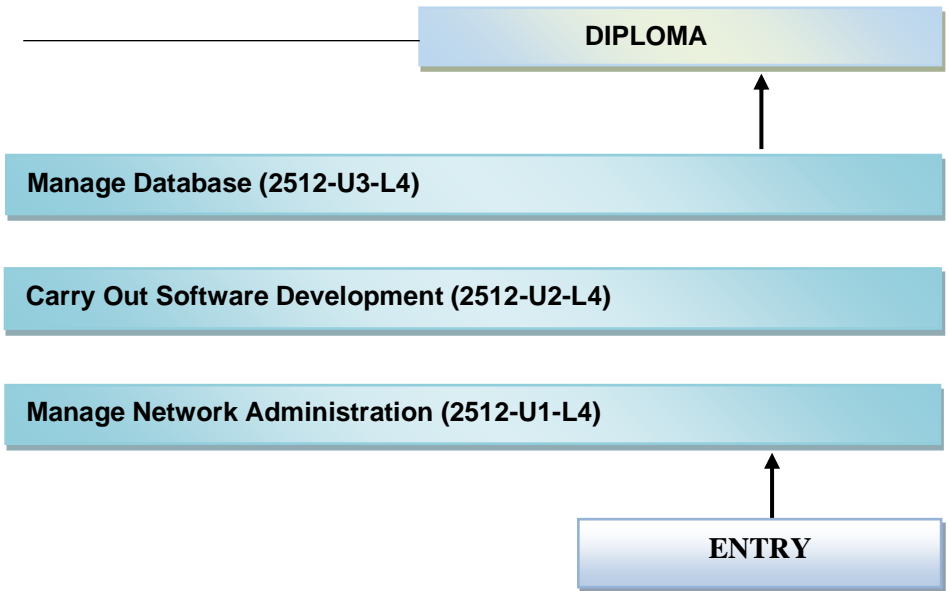
The TVET Quality Council, Bhutan Qualifications and Professionals Certification Authority would like to express our deepest appreciation to the following industry and subject matter experts who have participated in revision and validation of National Competency Standards for Information Technologist:

Experts involved in Validation of NCS for Information Technologist			
SN	Name	Designation	Organization
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3	Sonam Tobgay	Developer	ITechnologies
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5	Rinchen Khando	Dy. Executive engineer	GovTech
6	Reshan Kumar Powrel	Network Engineer	NGN
7	Sonam Jamtsho	ICTO	GovTech

Facilitator from the TVET Quality Council, BQPCA		
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PACKAGING OF QUALIFICATIONS



OVERVIEW OF NCS FOR INFORMATION TECHNOLOGIST

Unit Title	Element of Competence
1. Manage Network Administration	1.1 Design Network 1.2 Perform Installation and Network Configuration 1.3 Manage Network Equipment and Security Systems
2. Carry Out Software Development	2.1 Prepare for Software Development 2.2 Design User Interface 2.3 Perform Coding 2.4 Perform Software Testing and Debugging 2.5 Perform Deployment
3. Manage Database	3.1 Design Database 3.2 Perform Normalization 3.3 Perform Database Maintenance

UNIT TITLE	Manage Network Administration
DESCRIPTOR	This unit covers the competencies required to design, configure, troubleshoot and perform network security following safety at all times
CODE	2512-U1-L4
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Design Network	<p>1.1. Determine the network topology as per the geographical location and customer's requirement</p> <p>1.2. Assess network requirements as per the job requirement</p> <p>1.3. Finalize the network design as per the job requirement</p>
2. Perform Installation and Network Configuration	<p>2.1 Configure IP addressing and routing schemes as per the job requirement</p> <p>2.2 Configure and manage network Operating System as per the job requirement</p> <p>2.3 Install and setup network component following standard procedure</p> <p>2.4 Commission and test the network connectivity</p>

3. Manage Network Equipment and Security Systems	<p>3.1. Assess network security following standard procedure</p> <p>3.2. Troubleshoot network security and security devices following standard procedure</p> <p>3.3. Configure and upgrade network security and security devices following standard procedure</p> <p>3.4. Monitor network security following standard procedure</p> <p>3.5. Prepare documents and report following standard procedure</p>
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RANGE STATEMENT	
Network requirements may include but not limited to:	
<ul style="list-style-type: none"> • IP Address/Routing • DNS (Domain Name Service) • Firewalls • NOS (Network Operating System) 	<ul style="list-style-type: none"> • Network Protocol • Network Models • Network security
Network component may include but not limited to	
<ul style="list-style-type: none"> • Switches • Router 	<ul style="list-style-type: none"> • Firewall • Cabling and allied items
Network design may include but not limited to:	
<ul style="list-style-type: none"> • Logical 	<ul style="list-style-type: none"> • Physical

Network equipment and security devices may include but not limited to:	
<ul style="list-style-type: none"> • Router • Switches • Network Cables • Security Devices 	<ul style="list-style-type: none"> • Connectors • Firewall • Convertors • Network Interface Cards
Critical Aspects	
<ul style="list-style-type: none"> • Demonstrate compliance with occupational health and safety regulations applicable to worksite operation • Demonstrate compliance with international network and security standards and framework • Demonstrate competencies in troubleshooting network issues and network design • Demonstrate competencies in assessment and management of security threats and vulnerabilities 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety (OHS) Regulations • IP addressing and routing • Network Topology • Network OSI Models • Basic network security • Network Operating System • E-waste Management • SOP • International network and security standards and framework • Network Equipment 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Creativity • Innovation • Time Management • Self-Awareness • Coping with Emotion • Empathy • Critical Analysis • Entrepreneurial

UNIT TITLE	Carry Out Software Development
DESCRIPTOR	This unit covers the competencies required to prepare for software development; perform system design, perform system development; perform software testing and debugging and deployment
CODE	2512-U2-L4
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 procedure 1.4 Design a prototype based on SRS following standard procedure
2. Perform System Design	2.1 Design UI/UX as per SRS following standard procedure 2.2 Prepare database design following standard procedure 2.3 Demo and finalize UI/UX design following standard procedure

	2.4 Demo and finalize database design following standard procedure
3. Perform System Development	3.1 Setup development and UAT environment following standard procedure 3.2 Develop backend system (database) as per the approved SRS 3.3 Develop frontend system as per the approved SRS 3.4 Conduct Unit testing (UT) following standard procedure
4. Perform Software Testing and Debugging	4.1 Test software following software testing life cycle (STLC) 4.2 Debug issues following standard procedure 4.3 Update code and re-test following standard procedure 4.4 Update test logs following standard procedure
5. Perform Deployment	5.1 Set up production environment as per the job requirement 5.2 Deploy the software following standard procedure 5.3 Conduct sanity test in the production system

	5.4 Declare system go-live following standard procedure
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RANGE STATEMENT	
Backend framework may include but not limited to:	
<ul style="list-style-type: none"> • Django • JavaScript based framework • REST 	<ul style="list-style-type: none"> • Spring boot • TypeScript
Frontend framework may include but not limited to:	
<ul style="list-style-type: none"> • Nuxt.js • Vue.js • Python • Flutter • Abap • Tailwind CSS 	<ul style="list-style-type: none"> • Angular • Pinia • React • Svelte • Ui5/Fiori
Critical Aspect	
<ul style="list-style-type: none"> • Demonstrate compliance with occupational health and safety regulations applicable to worksite operation • Demonstrate competencies in programming concepts • Demonstrate competencies in SLDC (Software Development Life Cycle) • Demonstrate competencies in SLDC Tools • Demonstrate competencies in system testing • Demonstrate competencies in software development methodologies 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety (OHS) Regulations • SLDC • Storage units • Types of system security • Software development methodologies • DevOps/DevSecOps • Programming Fundamentals • MVC Framework • Micro services • API • Ticketing system • Types of programming languages • Coding standards • Resource Planning • E-waste management • Standard tools for project management • Documentation • Relevant rules and regulations 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Creativity • Innovation • Time Management • Self-Awareness • Coping with emotion • Empathy • Critical Analysis • Entrepreneurial

UNIT TITLE	Manage Database
DESCRIPTOR	This unit covers the competencies required to design database, perform normalization and database maintenance following standard procedure
CODE	2512-U3-L4
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Design Database	1.1 Design Database diagram following standard procedure 1.2 Create, read, update and delete (CRUD) database objects following standard procedure 1.3 Perform database tuning and optimization following standard procedure
2. Perform Normalization	2.1 Execute normalization to eliminate redundancy 2.2 Execute normalization to eliminate partial redundancy 2.3 Execute normalization to eliminate transitive dependency 2.4 Execute normalization to enhance system performance

3. Perform Database Maintenance	3.1 Execute performance tuning and index optimization following standard procedure 3.2 Execute database backup and restore as per the standard procedure 3.3 Ensure uptime and reliability of database following standard procedure
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RANGE STATEMENT

Critical Aspect

- Demonstrate compliance with occupational health and safety regulations applicable to worksite operation
- Demonstrate competencies in RDBMS
- Demonstrate competencies in designing Database diagram following standard procedure
- Demonstrate competencies in application of database normalization rules
- Demonstrate competencies to perform database optimization and tuning
- Demonstrate competencies in execute backup and restore as per the standard procedure

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety (OHS) Regulations • Types of normalization • Types of database • SQL Queries 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Creativity • Innovation

<ul style="list-style-type: none">• SQL Joins• Stored procedures and views	<ul style="list-style-type: none">• Time Management• Self-Awareness• Coping with emotion• Empathy
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ANNEXURE

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.

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 the 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.

Bhutan Qualifications Framework (BQF)

Bhutan Qualifications Framework is an integrated national framework that outlines all types of qualification in Bhutan. As an established and nationally accepted instrument, the BQF has been benchmarked against international practices in terms of standards. The BQF aims to recognize all forms of

learning systems, including formal, non-formal, and informal learning. It acknowledges technological advancements and recognizes contemporary modes of delivery. It covers a broad range of education systems including the TVET education.

Implementation of TVET Qualifications



*** RPL = Recognition of Prior Learning**

TVET Qualifications Levels

TVET Qualifications have seven levels as per the BQF as follows:

Bhutan Qualifications Framework 2023

Table 2: Qualification Types and Levels Based on Education Sector.

BQF Level	Community Education	School Education	TVET	Higher Education	Monastic Education
8				Doctoral Degree	<i>Khewang</i> མཁས་དབང་།
7			Master's Degree Postgraduate Diploma Postgraduate Certificate	Master's Degree Postgraduate Diploma Postgraduate Certificate	<i>Tsugla Gongma</i> གཞུག་ལག་ཡོང་མ།
6			Applied Degree	Bachelor's Degree Bachelor's Degree (Honours) Graduate Diploma Graduate Certificate	<i>Tsugla Wogma</i> གཞུག་ལག་ཡོང་མ།
5			Advanced Diploma	Advanced Diploma	
4			Diploma	Diploma	
3		Bhutan Higher Secondary Education Certificate	Certificate 3		<i>Dringrim Gongma</i> འགྲིང་རིམ་གོང་མ།
2		Bhutan Certificate for Secondary Education	Certificate 2		<i>Dringrim Barma</i> འགྲིང་རིམ་བར་མ།
1	ALC		Certificate 1		

Level Descriptors

The TVET Qualification levels are set based on the level descriptors, as defined in the BQF. The detail of the qualification level descriptor is as follow:

Level	<i>Knowledge</i>	<i>Skills</i>	<i>Values</i>	<i>Application</i>
	<i>Knowledge that is:</i>	<i>Demonstrate skills that involve:</i>	<i>Demonstrate values that involve:</i>	<i>Applied in contexts that involve:</i>
4	Broad theoretical, technical and operational	<p>Selecting and applying a range of standard processes relevant to varied and sometimes unpredictable tasks</p> <p>Selecting and applying a range of solutions involving formulation of solutions to resolve complex issues</p> <p>Demonstrating a high level of proficiency in English and Dzongkha</p>	<p>Strong level of awareness of self and others; and an appreciation of belief system, role of social norms, and the importance of relationship building</p> <p>Application of ethical norms and legal rules in decision-making; and comprehending the correlation between values and behavior</p>	<p>Stable tasks with predictable changes</p> <p>Broad guidance with some self-direction that requires sound judgement</p> <p>Taking some responsibility for planning and coordination with others</p>

			Commitment to own profession and quality of work	
3	Theoretical with some technical and operational processes	<p>Applying a range of standard processes to known but varied tasks</p> <p>Selecting and applying a range of solutions to familiar and unfamiliar problems</p> <p>Communicating effectively and clearly, both oral and written, in both English and Dzongkha</p>	<p>Sound level of self-awareness and beliefs; and ability to apply social norms and build relationships</p> <p>Application of a set of ethical norms</p> <p>Commitment to own field of interest and apply self-management of learning and performance</p>	<p>Stable tasks with some aspects of change</p> <p>General guidance and supervision that require discretion and judgement</p> <p>Adapting to own behaviour to work with others</p>
2	Basic, factual and conceptual	<p>Applying standard processes relevant to carry out known tasks</p> <p>Applying a set of known solutions to solve simple and</p>	<p>Some level of self-awareness and beliefs, and appreciation of social norms; and</p>	<p>Structured and stable tasks</p> <p>General support and Supervision that require some discretion</p>

		<p>straightforward issues</p> <p>Using simple and direct exchange of information on familiar and routine matters</p> <p>Developing basic proficiency in Dzongkha and English</p>	<p>significance of relationships</p> <p>Awareness of ethical norms, and openness to different activities</p> <p>Developing own knowledge and skills</p>	<p>and judgement</p> <p>Collaboration with others to achieve goals</p>
1	Foundational , every day and general	<p>Applying operational literacy, numeracy skills required to carry out simple tasks</p> <p>Applying simple solutions to solve simple and straightforward everyday issues</p> <p>Communicating using everyday expressions and simple phrases in Dzongkha and English</p>	<p>Basic awareness of self, beliefs, and social norms; and understand the significance of relationships</p> <p>Basic awareness of fundamental ethical norms, basic civil rights, and responsibilities</p>	<p>Highly structured tasks with close support and supervision</p> <p>Minimal Discretion and judgement</p> <p>Readiness to work together and share knowledge with others</p>

			Willingness to understand tasks and motivated to implement them successfully	
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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 practices. 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.

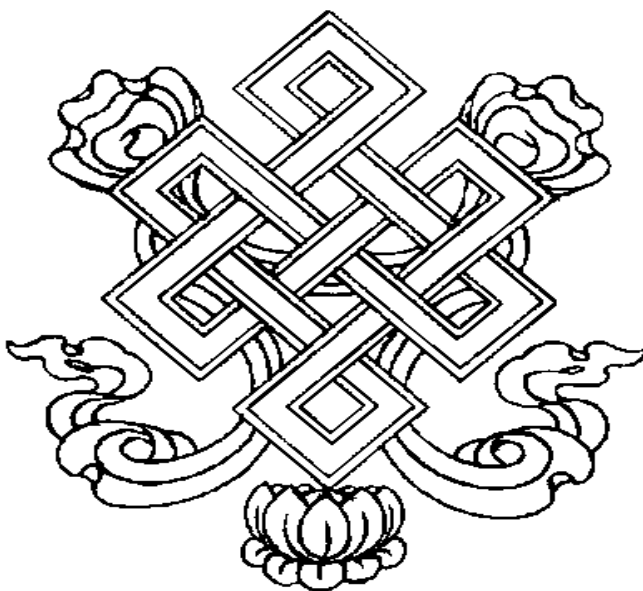
Coding the individual national competency standards

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.



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