National Vocational Certificate
Level 2 in
Information Technology
(Web Designing and Development)

Competency Standards

NAVTTC نیوٹک

National Vocational & Technical Training Commission
5th Floor, Evacuee Trust Complex
Sector F-5/1, Islamabad
Tel: +92 51 904404
Fax: +92 51 904404
Email: info@navttc.org

Author:
Mr. Zulqarnain Jaffary (Director COMSATS Institute of Information Technology Islamabad) , Mr. Hassan Altaf (Free Lance Web and Graphic Designer Islamabad)

Reviewed by:
Dr. Raimund Sobetzko (Team Leader, Component 2 TVET Reform Support Programme) , Mr. Muhammad Naeem Akhtar (Deputy Team Leader Component 2 TVET Reform Support Programme) , Mr. Ralf Strier (Senior International Technical Advisor, TVET Reform Support Program)

Layout and Design by:
Ms. Maria Arif (Freelance Consultant)

Date of approval by NCRC:
26th -27th June 2013

Date of Notification:
17th July 2013, vide notification no F.2-1/2013-DD(VT)

This curriculum has been produced by the National Vocational & Technical Training Commission (NAVTCC) with the technical assistance of TVET Reform Support Programme, which is funded by the European Union, the Embassay of the Kingdom of the Netherland, Federal Republic of Germany and the Royal Norwegian Embassy. The Programme has been commissioned by the German Federal Ministry for Economic Cooperation and Development and is being implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Table of Contents

1. Explain Internet Woking.....……03
2. Elaborate World Wide Web.....……06
3. Design a Website.....……...10
4. Plan the Website and explain Software Development life cycle for web application..……12
5. Use Database in Web Development…….....14
6. Develop website using client side scripting Languages..……16
7. Develop website using server side scripting Languages...……...19
8. Design and Present Final Project ……22
9. Perform Duties and exhibit rights at the workplace 23
10. Tools and Equipments.....25
11. List of Consumables……...27

Maintain Competency Standards: Web Design and Development

Title A: Explain Internet Working

Overview: The competency standard is about introducing students to the web development process and imparting knowledge that will enable the learner to explain the internet and computer networks.

Competency Unit	Performance Criteria	Knowledge and Understanding
A1. Explain the history and evolution of internet	**Trainee will be able to:** **P1.** Recount different Eras of Internet Evolution **P2.** Use internet for: • Effective Research • Preparing Reports • Efficient Communication • Getting Updates • Different learning methods	**Trainee will be able to:** **KI.** Define internet **K2.** Discuss the history and evolution of internet **K2.** Explain the working of internet
A2: Define and differentiate software and hardware	**Trainee will be able to:** **P1.** Recount the history of Software Evolution **P2.** Identify different types of software like: • Application Software • System Software **P3.** Handle the working of different software: • Installation • Implementation **P4.** Recount the history of Hardware Evolution	**Trainee will be able to:** **K1.** Define software **K2.** Spell out the role of software in a computer system **K3.** Explain different types of software **K4.** Elaborate the working of software **K5.** Define hardware **K6. E**xplicate the importance of hardware in a computer

	P5. Classify different components of Hardware like: • Input Devices (Keyboard, Mouse, Scanner, etc) • Output Devices (Monitor, Printer, etc) **P6.** Identify appropriate networking hardware including • routers, switches, hubs and gateways • Cables • Adapters • servers, firewalls **P7.** Identify the difference between software and hardware	system **K7.** Give in details of different hardware components in a computer **K8.** Label different hardware components in a computer **K9.** Define networking Hardware **K10.** List different networking hardware **K11.** Classify the difference between software and hardware
A3: Elaborate the working of computer networks	**Trainee will be able to:** **P1.** Share understanding of network **P2.** Recall the history of network **P3.** Identify different Network topologies such as: • Bus topology • Ring topology • Star topology • Mesh topology **P4.** Recognise basic components of a computer network such as: • NIC (Network Interface Card)	**Trainee will be able to:** **K1.** Define a network **K2.**Recount the history of networks **K3.** Generelise network topologies **K4.** List the basic components of a computer network

	• Hub • Switch • Router • Network Cables **P5.** Identify computer networks	**K5.** Explain the working of a computer network
A4: Differentiate different types of networks	**The trainee will be able to:** **P1.** Identify the different types of network and their functionality such as: • Personal Area Network • Local Area Network • Campus Area Network • Metropolitan area network • Wide Area Network • Virtual Private Network **P2.** Categorise different network types	**The trainee will be able to:** **K1.** List down the different types of network in order of scalability **K2.** Elaborate the functionality of different types of network **K3.** Describe the difference between different types of networks

B. Elaborate World Wide Web

Overview: The competency standard explains the World Wide Web with its history and architecture. It will also enable the learner to differentiate web protocols, types of websites and web threats.

Competency Unit	Performance Criteria	Knowledge and Understanding
B1. Discuss different Eras of Web	**Trainee will be able to:** **P1.** Memorize the history of world wide web **P2.** Identify the difference between website and webpage **P3.** Recognise different types of websites such as: • Web 1.0 (Read Web) • Web 2.0 (Social Web) • Web 3.0 (Semantic Web) **P4.** Compare Web 1.0, Web 2.0 and Web 3.0	**The student will be able to:** **K1.** Explain the history of world wide web **K2.** Define a difference between website and web page **K3.** List down the different types of websites **K4.** Establish difference between Web 1.0, Web 2.0 and Web 3.0
B2: Compare static websites with dynamic websites	**The trainee will be able to:** **P1.** Identify static website **P2.** Demonstrate the Workflow of a static website **P3.** Identify dynamic website **P4.** Demonstrate the workflow of a dynamic website **P5.** Classify architecture of a static website **P6.** Recognise dynamic website **P7.** Segregate static and dynamic websites	**The trainee will be able to:** **K1.** Define a static website **K2.** Explain the workflow of a static website **K3.** Define a dynamic website **K4.** Explain the workflow of a dynamic website **K5.** Elaborate the architectures of static and dynamic websites **K6.** Enhance the difference between static and dynamic websites

B3: Elaborate and differentiate web browsers	**The trainee will be able to:** **P1.** Identify a web browser **P2.** Comprehend working of a web browser **P3.** Demonstrate Installation and usage of different web browsers such as: • Internet explorer • Mozilla Firefox • Google Chrome • Safari **P4.** Recognise features/options of different web browsers **P5.** Compare different web browsers **P6.** Practise cross browser compatibility of websites	**The trainee will be able to:** **K1.** Define a web browser **K2.** Explain the working of a web browser **K3.** Show how to Install and use different web browsers **K7.** Illustrate the features/options of different web browsers **K8.** Describe features of different web browsers **K9.** Explain the meaning of cross browser compatibility of websites
B4. Compare different types of websites	**The trainee will be able to:** **P1.** Categorise different type of websites such as: • Personal websites • Information websites • Web portals • Webmail • Social networking websites • Blogs • Forums • Wiki websites • Search engines • Community websites • News websites etc.	**The trainee will be able to:** **K1.** Give details about different types of websites **K2.** Define working of different types of websites

B5. Identify different web threats and explain their security measures	**The trainee will be able to:** **P1.** Identify different web threats such as: • Viruses • Computer Worms • Trojans • Malware • SQL Injection • Cross-site Scripting (XSS) • Email Spam • Phishing • Denial-of-service attack (DoS attack) **P2.** Demonstrate different security measures for different web threats such as: • Installation of a antivirus software • Usage of antivirus to scan a computer for viruses and removing of viruses.	**The trainee will be able to:** **K1.** Elaborate what different web threats are and how they work. **K2.** Give details, which security measures could be taken for different web threats

B6. Highlight the process of domain registration and web hosting	**The trainee will be able to:** **P1.** Search Internet Service Providers (ISPs) **P2.** Show web hosting process **P3.** Perform domain registration process **P4.** Select any ISP for the website **P5.** Exhibit the process of getting web hosting package from the ISP **P6.** Select domain registration package from the ISP **P7.** Demonstrate uploading of website to a web server / web space provided by the ISP **P8.** Exhibit testing of the uploaded website on a web browser	**The trainee will be able to:** **K1.** Describe how to search Internet Service Providers (ISPs) **K2.** Explain the web hosting process **K3.** Put in plain words the appropriate process of domain registration **K4.** Define how to choose one of the ISP for website hosting **K5.** Express how to get the web hosting package from the ISP **K6.** Explain how to get the domain registration package from the ISP **K7.** Exhibit the uploading process of the website to the web server / web space provided by the ISP **K8.** Explicate the process of testing the uploaded website on a web browser
B7. Discuss shopping carts and e-commerce	**The trainee will be able to:** **P1.** Understand E-commerce **P2.** Identify some common business applications of E-commerce such as • Document automation in supply chain and logistics • Domestic and international payment systems • Enterprise content management • Group buying • Automated online assistants • Instant messaging • Newsgroups • Online shopping and order tracking • Online banking	**The trainee will be able to:** **K1.** Define and explain E-commerce **K2.**Tell about some common business applications of E- commerce

	• Online office suites • Shopping cart software • Teleconferencing • Electronic tickets • Social networking	

C. Design a Website

Overview: The competency standard aims to develop the skills, knowledge and understanding of designing a website usings any web designing software.

Competency Unit	Performance Criteria	Knowledge and Understanding
C1: Explain the basics of web designing	**The trainee will be able to:** **P1.** Understand Web designing **P2.** Recall the history of Web designing **P3.** Identify different types of Designs **P4.** Recognise Basic Elements of Design **P5.** Express Web Design Standards and Principles **P6.** Identify difference between web design and web development **P7.** Spot the difference between web design and graphic designing **P8.** Show the importance of design in a website	**The trainee will be able to:** **K1.** Define web designing **K2.** Explain the history of Web designing **K3.** Illustrate different type of designs **K4.** Highlight the basic elements of design **K5.** Spell out different web Design standards and principles **K6.** Define difference between web design and web development **K7.** Clarify the difference between web design and graphics designing **K8.** Explain the importance of design in a website

C2: Analyse different web design software	**The trainee will be able to:** **P1.** List different web designing software such as: • Adobe Photoshop • Macromedia Dreamweaver • Microsoft FrontPage • Microsoft Publisher • Adobe Flash etc. **P2.** Apply appropriate features and options of different designing software **P3.** Demonstrate Installation of different web designing software to a computer **P4.** Design Website in designing software	**The trainee will be able to:** **K1.** List down different web designing software **K2.** Highlight the features and options of different designing software **K3.** Explain how to install different web designing software to a computer **K4.** Design website in different web designing software
C3: Apply appropriate Website Templates in Website	**The trainee will be able to:** **P1.** Implement website templates **P2.** Search free and paid website templates from internet **P3.** Download website templates to a computer **P4.** Test website templates using any web browser **P5.** Edit different website templates in any web editor such as Macromedia Dreamweaver	**The trainee will be able to:** **K1.** Give detail of the process of implementation of website template **K2.** Define the appropriate search method for free and paid website templates form internet

D. Plan the Website and explain Software Development life cycle for Web Application

Overview: The competency standard aims to develop the skills, knowledge and understanding required for the project planning for a website design and implementing the software development lifecycle for any web project**.**

Competency Unit	Performance Criteria	Knowledge and Understanding
D1: Devise website project planning	**The trainee will be able to:** **P1.** Arrange and manage project meetings **P2.** Gather the project requirements perform storyboarding **P3.** Develop timelines **P4.** Perform financial evaluation (budgeting and costing) **P5.** Identify difference between functional and non functional Requirements **P6.** Demonstrate client management	**The trainee will be able to:** **K1.** Elaborate the importance of project meetings **K2.** Identify project requirements to perform storyboarding **K3.** Explain timelines **K4.** Define financial evaluation (budgeting and costing) **K5.** Clarify difference between functional and non functional requirements **K6.** Tell about the significance of client management

D2: Utilise the software development life cycle	**The trainee will be able to:** **P1.** Understand software development life cycle **P2.** Carry out the project analysis phase **P3.** Execute the design phase **P4.** Implement / code the project **P5.** Test the project **P6.** Execute the maintenance and support phase on a web server	**The trainee will be able to:** **K1.** Explain software development life cycle **K2.** Define Project analysis phase **K3.** Describe Design phase **K4.** Describe Implementation phase **K5.** Make clear the Testing phase **K6.** Define Maintenance and support phase

E. Use Databases in Web Development

Overview: Competency standard aims to assist to create a database of a website in any Database Management System.

Competency Unit	Performance Criteria	Knowledge and Understanding
E1: Discuss the basics and Historical Perspectives of Databases	**The trainee will be able to:** **P1.** Recognise basic database concepts such as: • Row • Column • Table • Relationships • Quires • Normalisation • Denormalisation • Database • Relational Database • Management System • Primary Key • Foreign Key • Indexing • Entity Relationship Diagram **P3.** Identify difference between free database and licensed database **P4.** Spell out the role of database in web applications	**The trainee will be able to:** **K1.** Define the basic concepts of databases **K2.** Distinguish free database and licensed database **K3.** Explain the role of database in web applications

E2: Differentiate different Database Management Systems (DBMS)	**The trainee will be able to:** **P1.** Compare options/Features of different database management systems **P2.** Install different database management systems on a computer such as: • Microsoft Access • Microsoft SQL Server • Microsoft SQL	**The trainee will be able to:** **K1.** Make clear the options and features of different database management systems **K2.** Analyse and install different database management systems
E3: Create Database of a Website in a Database Management System.	**The trainee will be able to:** **P1.** Design a Database of a web project such as: • Tables creation • Creation of Entity Relationship Diagram • Normalization / De-normalization of the Entity Relationship Diagram **P4.** Implement indexing and cascading to the database	**The trainee will be able to:** **K1.** Draft a database for any web project in any Database Management System

F. Develop website using Client Side Scripting Languages

Overview: The competency standard is designed to assist to use JavaScript, html and cascading style sheets in a website System.

Competency Unit	Performance Criteria	Knowledge and Understanding
F1: Write HTML for a website	**The trainee will be able to:** **P1.** Write Hypertext Mark-up Language (HTML) of a website **P2.** Implement HTML concepts such as: • Elements • HTML Editors • Attributes • Headings • Paragraphs • Formatting • Links • Head • Images Tables • Lists • Block • Layout • Forms • IFrames • Colours • Entities • URL Encode • Form • Media • Object • Audio • Video.	**The trainee will be able to:** **K1.** Define the Hypertext Mark-up Language (HTML) **K2.** Elaborate the implementation process of the HTML concepts

	P3. Implement HTML in software such as: • Macromedia Dreamweaver/ Microsoft FrontPage.	
F2: Use JavaScript in a website	**The trainee will be able to:** **P1.** Demonstrate client side scripting language **P2.** Implement JavaScript **P3.** Implement the basic Java Scripting concepts such as JavaScript Statements • Objects • Output • Comments • Variables • Data Types • Functions • Operators • Comparisons • Conditions • Switch • For Loop • While Loop • Breaks • Errors • Validation	**The trainee will be able to:** **K1.** Define client side scripting language **K2.** Explain Java Script **K3.** Illustrate the implementation process of the basics Java Script concepts

	• Window	
F3: Implement Cascading Style Sheets (CSS) in a website	**The trainee will be able to:** **P1.** Apply Cascading Style Sheets (CSS) **P2.** Implement the basic concepts of CSS such as: • CSS Syntax • Id & Class • Styling of Backgrounds • Text • Fonts • Links • Lists and Tables • CSS Border • Outline • Margin • Padding • Dimension • Positioning • Floating • Align • Colours • Colour HEX **P3.** Implement CSS usage: • Macromedia Dreamweaver / Microsoft FrontPage	**The trainee will be able to:** **K1.** Define and explain Cascading Style Sheets (CSS) **K2.** Elaborate the implementation process of the basic concepts of CSS

G. Develop a website using Server Side Scripting Languages

Overview: The competency standard is designed to develop the skills, knowledge and understanding required to develop a website in PHP and

Competency Unit	Performance Criteria	Knowledge and Understanding
G1: Develop a website using PHP	**The trainee will be able to:** **P1.** Apply PHP **P2.** Install PHP Editor such as: Macromedia Dreamweaver **P3.** Employ the PHP Environment and Syntax **P4.** Implement the: • PHP Variable Types • PHP Constants • Operator Types • PHP Decision Making • PHP Loop Types • PHP Arrays • PHP Strings • PHP GET and POSTPHP Files • PHP Functions • PHP Cookies and Sessions • PHP Sending Emails • PHP File Uploading • PHP Coding Standard • PHP Predefined Variables • PHP Regular Expressions • PHP Error Handling • PHP Built-in Functions **P5.** Install and configure MySQL database with a PHP website **P6.** Create dynamic web pages in PHP	**The trainee will be able to:** **K1.** Define PHP **K2.** Introduce PHP Editor **K3.** Explain the PHP Environment and Syntax **K4.** Install and Configure MySQL Database with PHP website **K5.** Define dynamic web pages in PHP

G2: Develop a website using ASP.NET	**The trainee will be able to:**	**The trainee will be able to:**
	P1. Employ Asp.Net	**K1.** Define Asp.Net
	P2. Install Visual Studio.Net / Visual Web Developer to a computer	**K2.** Elaborate the Installation process of Visual Studio.Net / Visual Web Developer to your computer
	P3. Explain the Dot Net Framework	**K3.** Give detail of the Dot Net Framework
	P4. Recognise environment of Visual Studio.Net / Visual Web Developer	**K4.** Explain the environment of Visual Studio.Net / Visual Web Developer
	P5. Explore the toolbars and windows of Visual Studio.Net / Visual Web Developer	
	P6. Identify different views of a web page such as: • Design View • Source View • Code View	
	P7. Put into practice the implementation of the HTML Controls such as: • Table • Div • Image • Text area etc.	**K5.** Explain the implement the HTML Controls
	P8. Apply the Server Controls such as: • Button • Textbox • Hyperlink • Radio Button • Calendar • Panel • Label etc.	**K6.** Define the Server Controls

	P9. Execute the Data Server Controls such as: • Grid View • Details View • Form View • SQL DataSource • Access DataSource etc. **P10.** Demonstrate the Validation Controls such as: • Required Field Validator • Range Validator • Validation Summary etc. **P11.** Apply the Navigation Controls such as: • Menu • Tree View etc. **P12.** Apply the Login Controls such as: • Login • Login View • Password Recovery etc. **P13.** Demonstrate: • Web Form • Master Page • Web User Control • HTML Page and Style Sheet.	**K7.** Explain and implement the Data Server Controls **K8.** Describe the Validation Controls **K9.** Tell about the Navigation Controls **K10.** Define the Login Controls .

H. Design and Present Final Project

Overview: The competency standard is about to develop a dynamic web application in any of the taught web development technology.

Competency Unit	Performance Criteria	Knowledge and Understanding
H1: Develop a dynamic website in ASP.Net / PHP	**The trainee will be able to:** **P1.** Design interface of a website in a web designing software **P2.** Develop a static or dynamic website in a web development software **P3.** Implement software development life cycle (SDLC) phases in a web project	**The trainee will be able to:** **K1.** Draft interface of a website in a web designing software
H2: Prepare a project document	**The trainee will be able to:** **P1.** Create a Project document including: • Analysis document • Design document • Implementation document • Testing document • Deployment document • Maintenance and Support document • User Manual	**The trainee will be able to:** **K1.** Devise the web project Analysis document

I. Perform Duties and Exhibit rights at the workplace

Overview: The competency standard aims to teach to develop a dynamic web application in any of the taught web development technology.

Competency Unit	Performance Criteria	Knowledge and Understanding
I1: Demonstrate Ethics and Professional Conduct	**The trainee will be able to:** **P1.** Understand the duty to take Ownership of the decisions/actions s/he makes or fails to make and their consequences. (Role Play) **P2.** Duty to show a high regard for resources entrusted to him/her Including: • Subordinates • Tangible assets (equipments) • Company profile. **P3.** Make decisions and act impartially/objectively free of self interest. (Quantified Self assessment can be performed e.g. case studies/white papers.) Areas like Conflict of Interest **P4.** Understand truth and act in truthful manner in conduct/communication. Such as: • Daily attendance enrolment on register, "What you say is what you did."	**The trainee will be able to:** **K1.**Understand the mandatory standard for • Responsibility • Respect • Fairness • Honesty
I2: Plan Business-process activities	**The trainee will be able to:** **P1.** Provide due assistance to in-line manager such as: • Coordinating recurring meetings • Intimate resource availability • Create and keep documentations • Validate applicable company defined standards.	**The trainee will be able to:** **K1.** Plan the business process activities in a proper way

	P2. Define activities such as: • Apply specific life cycle methodologies – (Requirement gathering, design solution, prototype, testing, documentations) **P3.** Identify: • Tasks and their scheduling • Define milestones • Learn optimal utilization of resources. **P4.** Estimate time such as: • Hours calculation for an activity • Calendar year official leaves • Company working timings **P5.** Achieve work breakdowns, divide module in smaller and more manageable components such as: • Testing a product may have components like interface, performance, and test cases. **P6.** Level resource due to work load such as: • Calculations of leisure hours of a worker.	
I3: Develop Aware about Rights	**The trainee will be able to:** **P1.** Inform and uphold the policies, rules/regulations that govern the work and workplace. **P2.** Report illegal conduct or illegitimate action to appropriate management. **P3.** Protect propriety or confidential information.	**The trainee will be able to:** **K1.** Recognize the inspirational requirements of human rights in employment context.

List of tools and equipment

Documents, policies and guidelines (Class size: 20 trainees/students)

20 copies per class	Text books for this course
20 copies per class	Organisational procedures for dealing with problems
20 copies per class	Organisational guidelines for responding to and reporting accidents
1 class set	Organisational policy and procedures for performing day to day task
5 copies per class	Directories of existing businesses
1 complete class copy as example (20 blank copies)	Examples of business plans
1 complete class copy as example (20 blank copies)	Examples of financial plans
1 class set	Advertising materials for potential business premises
1 class set	Copies of job advertisements
1 class set	Information on sources of finance
1 complete class copy as example (20 blank copies)	Business planner templates
1 complete class copy as example (20 blank copies)	Start-up-costs estimator
Contact details for colleagues, supervisor	

1 set (each)	**Hardware** • Computers • Scanner • Printer • Multimedia Projector • Microphone • Speakers
1 set (each)	**Software** • Visual Studio.Net (Latest version) OR Visual Web Developer (Latest version) • PHP (Latest version) • PHP Storm (Latest version) • MySQL and SQL Server (Latest version) • Macromedia Dreamweaver (Latest version) • Adobe Muse (Latest version) • Adobe Photoshop (Latest version) • Microsoft FrontPage & Microsoft Publisher (Latest version) • Microsoft Office (Latest version)

List of consumables

- Notebooks
- CDs
- CD/DVD Writers
- Photocopy Papers
- Ball pens
- Pencils
- Erasers
- Sharpeners
- Board Markers
- Plastic files
- Paper markers
- Flip chart papers
- Pin board pins
- Whiteboards
- Whiteboard Erasers
- Paper knifes
- Glue sticks
- Paper clips
- Scissors
- Punching Machine

National Vocational & Technical Training Commission (NAVTTC)
5th Floor Evacuee Trust Complex Sector F-5/1,
Islamabad.
T +92 51 904404
F +92 51 904404
E info@navttc.org
I http://www.navttc.org/