**COMPETENCY BASED STANDARD**

**INFORMATION AND COMMUNICATIONS**

**TECHNOLOGY SECTOR**



**Job Title**

 **APPLICATIONS PROGRAMMING**

**Second Strengthening Technical and Vocational Education and Training (SSTVET) Project**

**ADB Grant 0503-LAO**

**ISCO 2514.xx**

**CERTIFICATE LEVEL 3 | DRAFT VERSION 1 | MAY 2018**

**LAO PDR**

##### Occupation Area: Information Communications Technology

 **3514**

**Job Title: APPLICATIONS PROGRAMMING & Related Jobs**

**Competency Standard: ICT Certification Level 3**

**Nlvqf: 1**

**Draft Version: 2018-05-18**

|  |  |  |
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| Draft Edit prepared BY | ON:; | Dr. Mayra Christina M. Ambrocio | 2018 MAY |
| Presented TO | ON | SSTVETP | 2018 MAY |
| Presented TO | ON |  |  |
| Approved I for use BY | ON: |  |  |
| Approved II for use BY | ON: |  |  |
| Revision 1 DATE: | 2018 MAY |  |
| Revision 2 DATE |  |  |

##### CONTENTS

[Occupation Area: Information Communications Technology 1](#_Toc506301385)

[ICT **Error! Bookmark not defined.**](#_Toc506301386)

[CONTENTS 2](#_Toc506301387)

[A Foreword 2](#_Toc506301388)

[A.1 Project Title 3](#_Toc506301389)

[A.2 Project Donor & Number 5](#_Toc506301390)

[B Purpose of this competency standard 5](#_Toc506301391)

[C Competency Standard/ Qualification/ Job Description 5](#_Toc506301392)

[C.1 Job description 5](#_Toc506301393)

[D Outline of this Competency Standard 8](#_Toc506301394)

[E BASIC UNITS OF COMPETENCY 12](#_Toc506301395)

[UNIT 1 RESPOND TO WORKPLACE COMMUNICATION **Error! Bookmark not defined.**](#_Toc506301396)

[F COMMON UNITS OF COMPETENCY 23](#_Toc506301397)

[UNIT 1 Prepare construction materials & tools **Error! Bookmark not defined.**](#_Toc506301398)

[G CORE UNITS OF COMPETENCY Error! Bookmark not defined.](#_Toc506301399)

[UNIT 1 Install electric lighting systems, auxiliary outlets & lighting fixtures **Error! Bookmark not defined.**](#_Toc506301400)

[H ANNEX Error! Bookmark not defined.](#_Toc506301401)

[H.1 LAO World of Work **Error! Bookmark not defined.**](#_Toc506301402)

[H.2 LAO IT/ICT Sub-Sector Code **Error! Bookmark not defined.**](#_Toc506301403)

[H.3 Competency Map COMPUTER SYSTEMS AND NETWORK TECHNICIANS **Error! Bookmark not defined.**](#_Toc506301404)

[H.4 Competency Standard Development Team **Error! Bookmark not defined.**](#_Toc506301405)

[H.5 Notes / References: **Error! Bookmark not defined.**](#_Toc506301406)

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# Foreword

# Foreword

The 1991 Constitution of the Lao People’s Democratic Republic (Revised 2003), in Article 22 of the Lao PDR Constitution states: “The State attends to developing education and implements compulsory primary education in order to build good citizens with revolutionary competence, knowledge and abilities.” In addition, “The State and society attend to developing high quality national education, to create opportunities and [favorable] conditions in education for all people throughout the country, especially people in remote areas, ethnic groups, women and disadvantaged children.”

## In Article 27 of the Lao PDR Constitution state: “The State and society attend to developing skilled labor, upgrading labor discipline, promoting vocational skills and occupations and protecting the legitimate rights and benefits of workers.”

## Education for All 2015 National Review, The Technical and Vocational Education and Training (TVET) is clearly specified as one of the four sub‐sectors of the education system in the revised version of the Education Law of Lao PDR promulgated in July 2007. The TVET is divided into three levels: primary or first level (at upper secondary level), middle level and high level (at post‐secondary level. Thus TVET belongs partly to upper secondary education and partly to post‐secondary education, which is formally part of higher education according to the definitions.

## The government of Lao PDR recognizes education’s importance in achieving national development goals. The country relies heavily on external funding, however, it has shown improvements in recent years. According to government figures, in 2013/14, the education share of the government budget was 15.5%, up from 13.4% in 2009/10.

## The country has made significant progress, achieving 98.6% primary net enrollment and a gender parity rate of .99 for primary education. The major challenges that the education system faces are: reducing the high grade 1 dropout rate, enhancing equity, and improving learning outcomes. https://www.globalpartnership.org... Less than 10 percent of schools are connected to the Internet across many developing countries.

## Tracer study on 3,000 TVET graduates from 2007-2012 carried out by the World Bank in 2013 reported that most of the graduates work in the public sector. 30% of graduates, who were working secured a job before graduation. 45% of those who were working studied Business Administration. It shows that the profile of graduates from TVET does not correspond with the needs of the economy (VERLA, EMCS).

## In Laos, 22% of the labor force (15-64 years old) has upper secondary and tertiary level of education, the education level of the remaining part is below secondary. According to data from 2011, in comparison to other ASEAN (+6) countries, Laos had the lowest enrolment rate in upper secondary TVET with 1, 1% (China with 42, 6% had the highest rate, followed by Thailand at 39, 9%). On the other hand, Laos contributed the highest share of tertiary enrolment with 61 % followed by China (45%) and Malaysia (43%). Global Standards in TVET is used as reference.

##

## With reference to the Technical and Vocational Education and Training Development Plan 2016-2020 on “Education Law of the Lao PDR ref No. 04/NA dated July 3rd 2007 and the “Technical and Vocational Education and Training (TVET) Law, ref No. 42/NA dated December 23rd 2013.” The TVET sector plays an important part in the training of skilled workers for the industry and in meeting labor market needs. There have been no recent nationwide study on labor needs. In the most recent was made by ADB in 2009-2010, among 819 companies in 8 provinces in the study, the plan indicates a need on the need to improve the skills in the areas of” Agriculture, Tourism and hospitality, Construction and infrastructure and Information Technology.

|  |  |  |  |
| --- | --- | --- | --- |
| NVQF | Qualification | Entry requirements  | Duration of training |
| Level 1 | Certificate I |  Primary education or equivalent and higher  | 3-6 months |
| Level 3 | Certificate II | Primary education or equivalent and higher  | After Certificate I: 6 months |
|   |   |   | 1 year |
| **Level 3** | **Certificate III** |  | **After Certificate Level III: 1 year**  |

##  Project Title

## Second Strengthening Technical Vocational Education & Training (SSTVET) in LAO PDR

##

##  Project Donor & Number

## ADB Grant No. 0503-LAO (SF)

#  Purpose of this competency standard

## The Purpose of the Competency Standard for the INFORMATION COMMUNICATIONS TECHNOLOGY PROFESSIONALS - SOFTWARE AND APPLICATIONS DEVELOPERS AND ANALYSTS - APPLICATIONS PROGRAMMING LEVEL III is to provide a framework for Competency Based Training (CBT) Program resulting in Competent - APPLICATIONS PROGRAMMING under the INFORMATION COMMUNICATIONS TECHNOLOGY Sector of PDR Lao.

#

#  Competency Standard/ Qualification/ Job Description

## This Competency, Standards/ Qualification of SOFTWARE AND APPLICATIONS DEVELOPERS AND ANALYSTS – WEB AND MULTIMEDIA DEVELOPERS: APPLICATIONS PROGRAMMING for Certificate LEVEL III, defined in the Manual for Developing Competency Based Standards Version MAY 2013.

## This Qualification is packaged from the competency map of ICT PROFESSIONALS IN SOFTWARE DEVELOPMENT: WEBB TECHNICIANS as shown in section F of this document. This is designed to reflect the job roles of APPLICATIONS PROGRAMMING AND RELATED JOBS and employees performing data entry tasks for professionals and organizations in a range of workplace settings specifically applicable to Lao PDR.

## This Competency Standard sits at NVQF Level 2 in Lao PDR, and is developed in line with CBT approach.

## Job description

## This qualification covers the skills and knowledge in Basic, Common & Core Competencies required by the Certificate LEVEL III Qualification consists of competencies that an individual must achieve to enable her/him to SOFTWARE AND APPLICATIONS DEVELOPERS AND ANALYSTS – WEB AND MULTIMEDIA DEVELOPMENT: APPLICATIONS PROGRAMMING (Code: 2513.xx) maintain, support the optimal functioning of Internet and Intranet websites and web server hardware and server.

##  and support the optimal functioning of Internet and Intranet XFCTJUFTBOEXFCTFSWFSIBSEXBSFBOETPGUXBSF n,

## Person deemed competent in this qualification

* Has theoretical and practical knowledge of computer, Internet and Internet technologies
* Has a range of well-developed skills in creating, coding and modifying websites according to user’s requirements
* Has programming ability in using web/scripting application programming languages;
* Writing and maintaining program code, outlined in instructions and specifications in accordance with quality accredited standards;
* Revising, repairing or expanding existing programs to increase operating efficiency or adapt to new requirements;
* Compiling and writing documentation of program development;
* Identifying and communicating technical problems, processes and solutions;
* Working on jobs requiring minimal supervision and good communication skills.

**Job roles/employment outcomes**

The Certificate **Level 3** in SOFTWARE AND APPLICATIONS DEVELOPERS AND ANALYSTS - APPLICATIONS PROGRAMMINGis intended to prepare new employees or recognize and develop existing workers

**Job roles/employment outcomes**

The Certificate **Level 3** in APPLICATIONS PROGRAMMING is intended to prepare new employees or recognize and develop existing workers who are performing ICT-related software development and support to organization or office works and IT/ICT industry/sector.

Employment outcomes targeted by this qualification is APPLICATIONS PROGRAMMING develop existing workers who are performing ICT-related software development and support to organization or office works and IT/ICT industry/sector.

Employment outcomes targeted by this qualification is ICT PROFESSIONALS IN SOFTWARE DEVELOPMENT: APPLICATIONS PROGRAMMING.

**Application**

The qualification is in line with CBT principles and is suitable for a Lao PDR Apprenticeship pathway.

Where common/core units of competency are packaged to suit a particular industry sector or occupational outcome, Registered Training Organizations (RTOs) might issue, for example: a Certificate in ICT: APPLICATIONS PROGRAMMING. It should be noted that a qualification with a specialization does not change the title of the qualification.

**CAREER PATH INFORMATION**

Career path into the qualification

This qualification may be accessed by direct entry. From Secondary Schools (level 9 or 12) or anybody with partial Secondary Education that meets the entry requirements.

Career path from the qualification

Further training pathways from this qualification include Certificate Level III within the IT/ICT TRADE training package qualifications.

#  Outline of this Competency Standard

This Competency Standard contains ***Units of Competency*** as detailed within. These **Units** form the basis for CBT Learning Programmes for IT/ICT Trade. Each **Unit** contains the required **Elements of Competency**. Each **Unit** being able to stand alone when applied in a work situation.

Each **Unit** can be amended in content or structure to meet the evolving needs of the ICT PROFESSIONALS IN SOFTWARE DEVELOPMENT: APPLICATIONS PROGRAMMING. Changes and amendments to this Competency Standard will be made in line with the existing Quality Assurance Procedures as approved by the appropriate authority.

This Competency Standard is structured in line with the approved Manual for Developing Competency Standards, developed as a part of the SSTVET programme. For Quality Assurance purposes, each Unit is coded in line in the next section.

**Code Example**

With reference to the International Labor Organization website (<http://www.ilo.org/public/english/bureau/stat/isco/>), The International Standard Classification of Occupations (ISCO) is one of the main international classifications for which ILO is responsible. It belongs to the international family of economic and social classifications. In addition, ISCO is a tool for organizing jobs into a clearly defined set of groups according to the tasks and duties undertaken in the job. Its main aims are to provide: “a basis for the international reporting, comparison and exchange of statistical and administrative data about occupations; a model for the development of national and regional classifications of occupations; and a system that can be used directly in countries that have not developed their own national classifications.” PDR Lao together with many countries, have used one or more versions of ISCO as the model for their own national classifications. ISO defines the technicians- technical and related tasks connected with research and application of scientific or artistic concepts and operational methods, and government or business regulations. Competent performance in most occupations requires a skills at the third ISCO Skill level.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Occupation* | *Job* | *Major* | *Sub-major groups* | *Minor* | *Unit Type* | *Unit No.* | *Version No* |
| Software  | Information and Communications Technology Professionals |  |   |  |  |  |  |
|  |  | 2 | 25 | 1 | 1 | 4 | 01 |

**Selected Lao Standard Code Occupation (Ministry of Labor and Social Welfare) 2016 inclusion under the IT/ICT Trade Sector**

|  |  |  |
| --- | --- | --- |
| **Major Group** |  |  |
| **25 Information Communications Technology Professionals / Associates** |  |  |
|  |  |  |
|  | Sub-major |  |
|  | 251x.xx | Software and Applications Developers and Analysts |
|  |  |  | 2514.xx | Applications Programmers |

A person who has achieved this Qualification is competent to be:

* Applications Programmer
* Programmer-Analyst
* Computer Programmer
* Software and Applications Programmer
* Software Programmer
* Web Programmer
* Application Developer
* Java Programmer
* Software Developer

|  |  |  |
| --- | --- | --- |
| *Unit No.* | *CODE NO.* | *BASIC COMPETENCIES* |
| 1 | SSTVET-ICT3401 | Lead workplace communication in ICT field |
|  | *CODE NO.* | *COMMON COMPETENCIES* |
| 2 | SSTVET-ICT3402 | Solve Problems related to work activities in the ICT Field using calculations and techniques |
| 3 | SSTVET-ICT3403 | Adapt entrepreneurial and business knowledge and Skills |
|  | *CODE NO.* | *CORE COMPETENCIES* |
| 4 | SSTVET-ICT3404 | Perform Object-Oriented analysis and design using a programming language |
| 5 | SSTVET-ICT3405 | Apply object-oriented application programming interface (API) |
| 6 | SSTVET-ICT3406 | Develop website using HTML |
| 7 | SSTVET-ICT3407 | Develop website using CSS |
| 8 | SSTVET-ICT3408 | Develop website using JavaScript |
| 9 | SSTVET-ICT3409 | Apply .NET tools and technologies |
| 10 | SSTVET-ICT3410 | Work with database MY SQL Server |
| 11 | SSTVET-ICT3411 | Use relevant information and communications technologies and research to attain sustainable development |
| 12 | SSTVET-ICT3412 | Lead small teams in the ICT workplace |
| 13 | SSTVET-ICT3413 | Plan and perform group tasks in ICT |

# BASIC UNITS OF COMPETENCY

######  LEAD WORKPLACE COMMUNICATION IN THE ICT FIELD

|  |  |
| --- | --- |
| **UNIT CODE:** | SSTVET-ICT3401 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker to lead in the dissemination and discussion of ideas, information and issues in the workplace.  |

|  |
| --- |
| Elements & Performance Criteria  |
| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Communicate information about workplace processes
 | * 1. Appropriate communication method is selected
	2. Multiple operations involving several topics areas are communicated accordingly
	3. Questions are used to gain extra information
	4. Correct sources of information are identified
	5. Information is selected and organized correctly
	6. Verbal and written reporting is undertaken when required
	7. Communication skills are maintained in all situations.
 |
| 1. Lead workplace discussions
 | * 1. Response to workplace issues are sought
	2. Response to workplace issues are provided immediately
	3. Constructive contributions are made to workplace discussions on such issues as production, quality and safety
	4. Goals/objectives and action plan undertaken in the workplace are communicated.
 |
| 1. Create creative and formal written reports
 | * 1. Issues and problems are identified as they arise
	2. Information regarding problems and issues are organized coherently to ensure clear and effective communication
	3. Dialogue is initiated with appropriate personnel
	4. Communication problems and issues are raised as they arise.
	5. Communication problems are solved though the: identification the problem, research, analysis, solution generating, prototyping, and user testing and outcome evaluation.
	6. Software product was presented and accepted by the user, certifying its use and significance to the industry/company.
 |
| **Range of Variables** |
| **VARIABLES** | **RANGE** |
| 1. Methods of communication
 | May include but not limited to, writing:* 1. Non-verbal gestures
	2. Verbal
	3. Face to face
	4. Two-way radio or mobile phones
	5. Speaking to groups
	6. Using telephone
	7. Written
	8. Internet
	9. Verbal
 |
| Evidence Guide |
| **ASPECTS OF COMPETENCY** | **EVIDENCE REQUIREMENTS** |
| 1. Critical aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Use of Information and communications technologies.
	2. Dealt with a range of communication/information at one time.
	3. Made constructive contributions in workplace issues
	4. Sought workplace issues effectively.
	5. Responded to workplace issues promptly.
	6. Presented information clearly and effectively written form.
	7. Used appropriate sources of information.
	8. Asked appropriate questions.
	9. Provided accurate information.
 |
| 1. Underpinning knowledge and attitudes
 | * 1. Organization requirements for written and electronic communication methods
	2. Effective verbal communication methods.
 |
| 1. Underpinning skills
 | * 1. Organize information
	2. Understand and convey intended meaning
	3. Participate in variety of workplace discussions
	4. Comply with organization requirements for the use of written and electronic communication methods
 |
| 1. Resource implications
 | The following resources should be provided: * 1. Variety of Information
	2. Communication tools
	3. Simulated workplace
 |
| 1. Method of Assessment
 | Competency in this Unit should be assessed through:* 1. Competency in this unit must be assessed through
	2. Direct Observation
	3. Interview
 |
| 1. Context for Assessment
 | Competency may be assessed on the job or simulated environment:* 1. Competency should be assessed in the workshop or simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines.
 |

######  Solve Problems RELATED TO WORK ACTIVITIES in the ict field USING CALCULATIONS and techniques

|  |  |
| --- | --- |
| **UNIT CODE:** | SSTVET-ICT3402 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker to solve problems related to work place activities using calculations and techniques |

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| --- |
| Elements & Performance Criteria  |
| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Identify the problem
 | The variances are identified from normal operating parameters; and product qualityExtent, cause and nature are of the problem are defined through observation, investigation and analytical techniquesProblems are clearly stated and specified.Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones; synthesize elementary proofs, especially proofs by inductionModel and analyze computational processes using analytic and combinatorial methods.Apply principles of discrete probability to calculate probabilities and expectations of simple random processes.Work in small teams to accomplish all the objectives above. |
| 1. Determine fundamental problem causes
 | * 1. Possible causes are identified based on experience and the use of problem solving tools / analytical techniques.
	2. Possible cause statements are developed based on findings
	3. Fundamental causes are identified per results of investigation conducted.
 |
| 1. Determine corrective actions
 | * 1. All possible options are considered for resolution of the problem
	2. Strengths and weaknesses of possible options are considered
	3. Corrective actions are determined to resolve the problem and possible future causes
	4. Action plans are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures.
 |
| 1. Provide recommendations
 | * 1. Report on recommendations are prepared
	2. Recommendations are presented to appropriate personnel in line with SOP & QMS
	3. Recommendations are followed-up as required.
 |
| **Range of Variables** |
| **VARIABLES** | **RANGE** |
| 1. Calculations and techniques
 | CalculusStatisticsResearch format and applications |
| 1. Analytical techniques
 | BrainstormingIntuition & LogicCause and effect diagramsPareto analysisSWOT analysisGant chart, Pert CPM and graphsScatter-grams.  |
| Problem issues | Non – routine process and quality problemEquipment selection, availability and failureTeamwork and work allocation problemSafety and emergency situations and incidents. |
| Action plans | Priority requirementsMeasurable objectivesResource requirementsTimelinesCo-ordination and feedback requirementsSafety requirementsRisk assessmentEnvironmental requirements. |
| **Evidence Guide** |
| **ASPECTS OF COMPETENCY** | **EVIDENCE REQUIREMENTS** |
| 1. Critical aspects of Competency
 | Assessment requires evidence that the candidate:1. Identified the problem
	1. Determined the fundamental causes of the problem
	2. Determined the correct / preventive action
	3. Provided recommendation to manager
	4. These aspects may be best assessed using a range of scenarios / case studies / what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.

Ethics and professional conduct in IT/ICT is demonstrated.  |
| 1. Underpinning knowledge and attitudes
 | * 1. Knowledge and understanding of the problem solving process.
	2. Fundamental concepts of Calculus and Statistics
	3. Application of Calculus and Statistics
 |
| 1. Underpinning skills
 | * 1. Using range of formal problem solving technique
	2. Identifying and clarifying the nature of the problem
	3. Devising the best solution
	4. Evaluating the solution
	5. Implementation of a developed plan to rectify the problem
 |
| 1. Resource implications
 | The following resources should be provided: * 1. Access to an operating plant over an agreed period of time
	2. A suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as bank of questions which will be used to probe the reason behind the observable action.
 |
| 1. Method of Assessment
 |  Competency in this Unit should be assessed through:* 1. Case studies on solving problems in the workplace
	2. Observation. The unit may be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation.

  |
| 1. Context for Assessment
 | Competency may be assessed on the job or simulated environment:1. Assessment shall be in the workplace. It may be appropriate to assess this unit concurrently with relevant teamwork or operational units.
2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines.
 |

***UNIT 3 ADAPT ENTREPRENEURIAL, BUSINESS AND ACCCOUNTING INCLINATION***

|  |  |
| --- | --- |
| **UNIT CODE:** | SSTVET-ICT3403 |
| **UNIT DESCRIPTOR:** This unit covers knowledge, skills and attitudes required of a worker to observe in the conduct of basic market research and statistics on demand and supply, software tools for personal, accounting and small- business and marketing content materials. |
| **ELEMENTS** |  **PERFORMANCE CRITERIA***(Italized items are elaborated in the range of variables)* |
| * 1. Understanding economics and entrepreneurial concepts
 | Successful entrepreneurs’ skills are identified:* + 1. Resiliency
		2. Focus
		3. Long-term Investing
		4. People Management
		5. Innate/Personal Traits
			1. Salesmanship
			2. Self-reflection
			3. Self-reliance
		6. Other traits

The law on demand and supply and basic economics concepts are understood:* + 1. Law on Supply
		2. Law on Demand
		3. Supply and Demand Relationship
		4. Equilibrium and Disequilibrium
		5. Shift and Movement
		6. Economics and Markets, Marketing tools

A comprehensive personal or group entrepreneurial skills in comparison with successful entrepreneurs’ skills is presented in tabular and textual form.Communication skills in written and oral form are applied. |
| Apply and use tools or applications for personal and small-business budgeting, accounting  | * 1. Explored on various productivity, accounting and business software
	2. Identify the latest software, hardware and application systems for business.
	3. Create a personal, family and small-business budget plans and forecast
	4. Software for budget preparations, simple budget analysis, sales and sales forecasting are used.
 |
| 1. Identify the requirements and processes in setting-up a small business.
 | 3.1 Various types of business are explored on:* + 1. Home Business
		2. Services
		3. Product Sales
		4. Online Business
	1. Basic marketing strategies for business that would best-fit a business case is presented in a report format.
	2. A market research is prepared.
 |
| 1. Conduct basic market research and statistics on demand and supply
 | * 1. Conduct a case analysis adapting learned concepts.
	2. Adept on the parts and process of creating small business plan and its requirements
	3. Adopt simple successful business strategies used by leading entrepreneurs
	4. Use software and statistical tools for the business case/project
 |

**RANGE OF VARIABLES**

|  |  |
| --- | --- |
| 1. Business Processes
 | * 1. Law on demand and supply
	2. Economic concepts
	3. Laws on setting-up a small-business
	4. Local requirements
	5. Markets and Marketing concepts
 |
| 1. Budget and forecasting
 | * 1. Software applications and systems for forecast
	2. Statistical and Mathematica tools.
 |
| 1. Market research
 | * 1. Primary data or information
	2. Secondary data or information
	3. Guidelines on using data gathering tool
 |
| 1. Communication skills
 | * 1. Writing business letters
	2. Presenting one-self to a person or group
	3. Values and characteristics of business professional
 |

 **EVIDENCE GUIDE**

|  |  |
| --- | --- |
| 1. Critical aspects of competency
 |  Assessment requires evidence that the candidate:* 1. Followed OHS policies and procedures
	2. Used software tools for business-related activities and analysis
	3. Communicate effectively.
	4. Perseverance and professional ethics.
 |
| 1. Underpinning knowledge and attitude
 | * 1. Clear understanding of business and marketing concepts as:
		1. Law on Supply
		2. Law on Demand
		3. Supply and Demand Relationship
		4. Equilibrium and Disequilibrium
		5. Shift and Movement
		6. Economics and Markets, Marketing
 |
| 1. Underpinning skills
 | * 1. Ability to read and understand ohms workplace documents in English
	2. Work effectively with others
	3. Ability to follow simple directions, charts, and procedures
 |
| 1. Resource implications
 |  The following resources must be provided:* 1. Laboratory Room
	2. Work place procedure
	3. Materials relevant to the proposed activity
	4. All tools, equipment, material and documentation required
	5. Relevant specifications or work instructions
 |
| 1. Methods of Assessment
 |  Competency must be assessed through:* 1. Written test
	2. Oral questions
	3. Computer laboratory work
	4. Demonstration
	5. Rubrics for laboratory work or outputs
 |
| 1. Context of Assessment
 | * 1. Competency should be assessed in an actual workshop or simulated environment.
 |

***CORE COMPETENCIES***

***UNIT 4 PERFORM OBJECT-ORIENTED ANALYSIS AND DESIGN USING A PROGRAMMING LANGUAGE***

|  |  |
| --- | --- |
| **UNIT CODE:** | SSTVET-ICT3404 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker needed using a programming language constructs to create applications using an object-oriented programming language (OOP), and to effectively use object-oriented technologies, software modelling and development process.  |

|  |
| --- |
| Elements & Performance Criteria  |

|  |  |
| --- | --- |
| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Create user-defined types, object, classes, methods and interfaces.
 | 1.1 User defined type is created1.2 An object from problem domain is found1.3 Field, property and method inside a class are kept1.4 Association relationship is defined1.5 Association relationship between objects is defined1.6 A class with the collection of another class is created1.7 The essence of inheritance relationship is understood1.8 Static class and method from real life example are defined1.9 Abstract class method and interface are introduced* 1. Abstract class and interface are differentiated
	2. Interface as a type is used
	3. Abstract class is declared
 |
| 1. Apply Basics of Java language and object-oriented concepts.
 | * 1. The object-oriented concept is introduced and understood.
	2. ***Executable Java applications*** are created in accordance with Java framework
	3. Java packages are imported to make them accessible in the code
	4. ***Working with Java Data types*** is demonstrated in accordance with Java framework
	5. ***Using Operators and Decision Constructs*** is demonstrated in accordance with Java framework
	6. ***Creating and Using Arrays*** is demonstrated in accordance with Java framework
	7. ***Using Loop Constructs*** is demonstrated in accordance with Java framework
 |
| 1. Study Methods and Encapsulation
 | 1. The methods with arguments and return values are created in accordance with Java framework
2. The static keywords are applied to methods and fields in accordance with Java framework
3. The overloaded method is created in accordance with Java framework
4. Access modifiers are applied in accordance with Java framework
5. Encapsulation principled are applied to a class in accordance with Java framework
 |
| 1. Work with Inheritance and Handling Exceptions
 | 3.1 The concept of Inheritance is implemented in accordance with Java framework3.2 The code that demonstrates the use of polymorphism is developed in accordance with Java framework3.3 Super and this syntax are used to access objects and constructors in accordance with Java framework3.4 Abstract classes and interfaces are used in accordance with Java framework3.5 How exceptions alter normal program flow are determined by creating a try-catch block.  |
| 1. Inspect Object-Oriented Concepts and Terminology
 | 4.1 All-important object-oriented (OO) concepts are described in accordance with Java framework4.2 The fundamental OO terminology are defined in accordance with Java framework |
| 1. Discuss Modeling and Software Development Process
 | 5.1 An Object-Oriented Software Development (OOSD) process is explained in accordance with Java framework5.2 The benefits of modeling software are explained in accordance with Java framework5.3 Purpose, activities, and artifacts of the following ***OOSD workflows (disciplines)*** are explained. |
| 1. Create Use Case Diagrams and Use Case Scenarios
 | 6.1 The need for a Use Case Diagram is justified in accordance with Java framework6.2 Use Case Diagram for a software system is developed based on the goals of the business owner 6.3 The Use Case Diagrams is developed based on the goals of all the stakeholders 6.4 Use Case form is created describing a summary of the scenarios in the main and alternate flows.  |
| 1. Use transition Analysis to Design using Interaction Diagrams
 | * 1. Purpose and elements of the Design model are explained in accordance with Java framework
	2. Essential elements of a UML Communication diagram are identified in accordance with Java framework
	3. Communication diagram view of the Design model is created in accordance with Java framework
	4. Sequence diagram view of the Design model is created in accordance with Java framework
 |
| 1. Use architectural Concepts and Architecture Tiers Diagrams
 | * 1. Difference between architecture and design is distinguished in accordance with Java framework
	2. Tiers, layers, and systemic qualities are described

in accordance with Java framework* 1. Architecture workflow is described in accordance with Java framework
	2. Architecture Tiers are defined in accordance with Java framework.
 |

**Range of Variables**

|  |  |
| --- | --- |
| 1. Executable Java applications
 | May include the following but not limited to:* 1. Sample programs using name, and date.
 |
| 1. Working with Java data types
 | May include but not limited to:* 1. Define Variables
	2. Declare and initialize variables
	3. Differentiate between object references and primitive variables
	4. Read and write to object fields
	5. Explain an object’s lifecycle (creation, dereference, and garbage collection)
	6. Call methods on objects
	7. Manipulate data using String Builder class and its methods
	8. Create and manipulate Strings
 |
| 3. Using Operators and Decision Constructs Symbols | May include but not limited to:* 1. Java operators and its use/s
	2. Use parenthesis to override operator precedence
	3. Test equality between strings and other objects using == and equals()
	4. Create and use if-else constructs
	5. Use a switch statement
 |
| 1. Create and use arrays
 | * 1. Declare, initialize, and use a one-dimensional array
	2. Declare, initialize, and use a multi-dimensional array
	3. Declare and use an ArrayList
 |
| 1. Using Loop Constructs
 | * 1. Create and use while loops
	2. Create and use for loops including the enhanced for loop
	3. Create and use do-while loops
	4. Compare loop constructs
	5. Use break and continue
 |
| 1. OOSD Workflows
 | * 1. Requirements Gathering
	2. Requirements Analysis,
	3. Architecture and Design, Implementation
	4. Testing & Deployment
 |
| 1. Defining Architecture Tiers
 | * 1. Describe the concepts of the Client and Presentation tiers
	2. Describe the concepts of the Business tier
	3. Describe the concepts of the Resource and Integration tiers
	4. Describe the concepts of the Solution model
 |

**EVIDENCE GUIDE**

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| --- | --- |
| 1. Critical Aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Set objectives
	2. Application of the Basics of Java language
	3. Worked with Methods and Encapsulation
	4. Worked with Inheritance and Handling Exceptions
	5. Use object-oriented technologies and perform object-oriented analysis and design.
	6. Follow a software development process using an OO software project.
	7. Use the widely adopted graphical modeling language - the Unified Modeling Language (UML) version
	8. Manage complexity of artifacts; describe the problem and proposed solution.
 |
| 1. Underpinning Knowledge
 | * 1. Planning objectives
		1. Method of creating user defined type
		2. Procedure of keeping field, property, method inside a class
		3. Definition of association relationship
		4. The essence of inheritance relationship
		5. Definition of static class and method from real life example
		6. Difference between abstract class and interface
		7. Uses of various Java programming language constructs to create several Java technology applications
		8. Define the scope of variables
		9. Define the structure of a Java class
		10. Differentiate between default and user-defined constructors

2.2 Uses of decision and looping constructs and methods to dictate program flow* 1. Basic error handling for your Java technology programs
	2. Intermediate Java programming and object-oriented (OO) concepts in Java technology programs
		1. Determine the effect upon object references and primitive values when they are passed into methods that change the values
		2. Differentiate between the type of a reference and the type of an object Determine when casting is necessary
	3. Java technology and the Java programming language
	4. Understanding of basic object oriented concepts such as inheritance, encapsulation, and abstraction
		1. Uses and manipulation of object references to write simple error handling code
		2. Differentiate among checked exceptions, RuntimeExceptions, and Error
		3. Describe what exceptions are used for in Java
		4. Invoke a method that throws an Exception
		5. Recognize common exception classes and categories
	5. Recognize and document use case dependencies using UML notation for extends, includes, and generalization
	6. Describe how to manage the complexity of Use Case Diagrams by creating UML packaged views Identify and document scenarios for a use case
	7. Describe how to reference included and extending use cases
	8. Identify and document non-functional requirements (NFRs), business rules, risks, and priorities for a use case
	9. Identify the purpose of a Supplementary Specification Document
	10. Identify the essential elements in an Activity diagram
 |
| 1. Underpinning Skills
 | * 1. Computer operations and programming skills
	2. Logical and problem solving skills
	3. Planning and organizing skills
	4. Communication skill
 |
| 1. Resource Implications
 | The following resources **MUST** be provided:* 1. Materials, tools, equipment and facilities appropriate to the proposed activities
	2. UML
	3. Integrated Development Environment for Java
	4. Internet Connection
 |
| 1. Methods of Assessment
 | Competency may be assessed through:* 1. Direct observations /questioning, Interview
	2. Practical exercises on tasks involving interpretation of a range of technical drawings
 |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	3. Assessment shall be observed while task are being undertaken whether individually or in-group
 |

***UNIT 6 APPLY OBJECT-ORIENTED APPLICATION PROGRAMMING INTERFACE (API)***

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| **UNIT CODE:** | SSTVET-ICT3406 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker in creating Application Programming Interfaces (API) for designing Java interfaces and handle Java programming. |

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| Elements & Performance Criteria  |

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| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Apply Basics of Java Class Design | 1.1 *Access modifiers* are used in accordance with Java framework1.2 Instance of operator and casting are used in accordance with Java framework1.3 Virtual method invocation is used in accordance with Java framework* 1. Override methods from the *Object class* are used to improve the functionality of class
	2. Package and import statements are used in accordance with Java framework
 |
| 1. Apply Java Advanced Class Design and Object Oriented Design Principles
 | 2.1 Proper use of when and how to apply abstract classes is identified2.2 Abstract Java classes and subclasses are constructed in accordance with Java framework2.3 Static and final keywords are used in accordance with Java framework2.4 Top-level and nested classes are created in accordance with Java framework2.5 Enumerated types are used in accordance with Java framework* 1. Write code that declares, implements, and/or extends interfaces
	2. *Object Oriented Design Principles* are applied in accordance with Java framework

2.8 *Generics and Collections Principles* are used in accordance with Java framework |
| 1. Apply String Processing, Exceptions and Assertions
 | 3.1 Search, parse, and *build strings* are used in accordance with Java framework3.2 String formatting is used in accordance with Java framework3.3 Throw and throws statements are used in accordance with Java framework3.4 Try statement with multi-catch is used in accordance with Java framework3.5 Autoclose features with a try-with-resources statement are used in accordance with Java framework3.6 Custom exceptions are created in accordance with Java framework3.7 Invariants by using assertions are tested in accordance with Java framework |
| 1. Build Database Applications with JDBC
 | 4.1 Layout of the JDBC API is defined in accordance with Java framework4.2 JDBC driver is used to connect to database in accordance with Java framework4.3 JDBC RowSetProvider, RowSetFactory, and RowSet interfaces are used in accordance with Java framework4.4 Prepared Statement and Callable Statement objects are created and used |
| 5. Monitor Operating System Performance | 5.1 Monitoring CPU Usage is demonstrated in accordance with Java framework5.2 Monitoring Network I/O is demonstrated in accordance with Java framework5.3 Monitoring Disk I/O is demonstrated in accordance with Java framework5.4 Monitoring Virtual Memory Usage is Demonstrated in accordance with Java framework5.5 Monitoring *Java Virtual Machine* is demonstrated in accordance with Java framework5.6 *Garbage Collection Tuning* is demonstrated in accordance with Java framework |
| 6. Work with Language Level Concerns and Garbage Collection | 6.1 Garbage Collection Algorithms are created in accordance with Java framework6.2 Types of Garbage Collectors are demonstrated in accordance with Java framework6.3 JVM Ergonomics are demonstrated in accordance with Java framework 6.4 Garbage Collection is tuned in accordance with Java framework6.5 Correct Garbage Collector is selected in accordance with Java framework6.6 Garbage Collection Output is interpreted in accordance with Java framework |
| 7. Work with Performance Tuning at the Language Level | 7.1 Reference Types in Java are demonstrated in accordance with Java framework7.2 The use of Finalizers is demonstrated in accordance with Java framework7.3 String-efficient Java Applications are demonstrated in accordance with Java framework7.4 Collection Classes are demonstrated in accordance with Java framework7.5 Threads are used in accordance with Java framework7.6 I/O is efficiently used in accordance with Java framework |

**Range of Variables**

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| 1. Object Oriented Design Principles
 | * 1. Choose between interface inheritance and class inheritance
	2. Develop code that implements IS-A and/or HAS-A relationships (apply high cohesion and low coupling principles)
	3. Apply object composition principles (including HAS-A relationships)
	4. Design a class using the Singleton design pattern
	5. Write code to implement the Data Access Object (DAO) pattern
	6. Design and create objects using a Factory, and use factories from the API
 |
| 2. Generics and Collections Principles | * 1. Use the diamond syntax to create a collection and for type inference
	2. Analyze the interoperability of collections that use raw types and generic types
	3. Use wrapper classes, autoboxing and unboxing
	4. Create and use List, Set, and Deque implementations
	5. Create and use a Map
	6. Use java.util.Comparator and java.lang.Comparable
	7. Sort and search arrays and lists
 |
| 1. Build Strings
 | * 1. Scanner
	2. StringTokenizer
	3. StringBuilder
	4. String
	5. Formatter
 |
| 1. Java Virtual Machine
 | * 1. HotSpot Generational Garbage Collector
	2. Monitor the Garbage Collector with Command Line Tools
	3. Monitor the Garbage Collector with VisualVM
	4. Monitor the JIT Compiler
	5. Throughput and Responsiveness
 |
| 1. Garbage Collection Tuning
 | * 1. Find Memory Leaks
	2. Identify Lock Contention
	3. Heap Profiling Anti-patterns
	4. Method Profiling Anti-patterns
	5. Garbage Collection
	6. Generational Garbage Collection
	7. GC Performance Metrics
 |

**EVIDENCE GUIDE**

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| 1. Critical Aspect of Competency | 1.1 Performed multiple operations on database tables, including creating, reading, updating and deleting using JDBC technology1.2 Process strings using a variety of regular expressions and create high-performing multi-threaded applications that avoid deadlock1.3 Implement input/output (I/O) functionality to read from and write to data and text files and understand advanced I/O streams1.4 Create Java technology applications that leverage the object-oriented features of the Java language, such as encapsulation, inheritance, and polymorphism* 1. Set up a performance-tuning environment
	2. Monitor Java applications
	3. Apply rigor to the task of performance tuning
	4. Use various tools and mechanisms for monitoring, profiling and tuning Java applications
 |
| 2. Underpinning Knowledge | * 1. Knowledge of Java I/O Fundamentals
		1. Read and write data from the console
		2. Use streams to read and write files
	2. Knowledge Java File I/O (NIO.2)
		1. Use the Files class to check, delete, copy, or move a file or directory
		2. Use the Path class to operate on file and directory paths
		3. Read and change file and directory attributes
		4. Recursively access a directory tree using the DirectoryStream and FileVisitor interfaces
		5. Find a class using the PathMatcher class
		6. Watch a directory for changes by using WatcherService
	3. Understand fundamentals of Java Virtual Machine
		1. Performance Principles
		2. Common Performance Problems
		3. Performance Methodology
		4. Development and Performance

2.4 Apply basic performance tuning principles to a Java application2.5 Profile the performance of a Java Application and tune the performance of a Java application at the language level |
| 1. Underpinning Skills
 | 3.1 Basic computer operation skills3.2 Logic analysis3.3 Communication skills Code writing and debugging skills |
| 1. Resource Implication
 | * 1. Computer with: UML tools, Integrated Development Environment for Java
	2. Access to internet
	3. Conducive testing environment
 |
| 1. Method of Assessment
 | The assessor will assess candidate with-5.1 Portfolio 5.2 Oral Questioning, Interview |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	3. Assessment shall be observed while task are being undertaken whether individually or in-group
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***UNIT 6 DEVELOP WEBSITE USING HTML***

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| **UNIT CODE:** | SSTVET-ICT3406 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker required in HTML. It specifically includes the tasks of understanding HTML, working with HTML organized as a paragraph, list, heading, link, image, multimedia player, form, or one of many other available elements or even a new element. |

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| Elements & Performance Criteria  |

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| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Understand HTML basics.
 | * 1. The basics of HTML was identified: elements, attributes, and other terms.
	2. The structure of HTML element, page, and basic language features are identified.
	3. The Entities & attributes of HTML (Hypertext Mark-up Language) is explained.
	4. HTML of a website is written.
	5. HTML concepts is implemented.
	6. HTML is implemented.
	7. Use web tools
 |
| 1. Coding HTML
 | * 1. [HTML forms](http://www.w3schools.com/html/html_forms.asp) are identified.
	2. [HTML form elements](http://www.w3schools.com/html/html_form_elements.asp) are used.
	3. [HTML input types](http://www.w3schools.com/html/html_form_input_types.asp) are used.
	4. [HTML input attributes](http://www.w3schools.com/html/html_form_attributes.asp) are used.
	5. HTML Graphics are used.
	6. [HTML Media](http://www.w3schools.com/html/html_media.asp) is used.
 |
| 1. Apply modern design elements and trends
 | * 1. Web responsiveness is applied.
	2. The use of images, videos, and product and card designs are implemented.
	3. Typography is defined.
		1. Different lettering styles are described.
		2. Guidelines for print typography is described and applied.
		3. The role of typography on the web is described.
		4. Guidelines for web typography is described and applied.
 |

**Range of Variables**

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| 1. Web Entities & attributes
 | May Include:* 1. Network Topology
	2. Distribution Terminals
	3. [HTML Introduction](http://www.w3schools.com/html/html_intro.asp)
	4. [HTML Editors](http://www.w3schools.com/html/html_editors.asp)
	5. [HTML Attributes](http://www.w3schools.com/html/html_attributes.asp)
	6. [HTML Headings](http://www.w3schools.com/html/html_headings.asp)
	7. [HTML Paragraphs](http://www.w3schools.com/html/html_paragraphs.asp)
	8. [HTML Styles](http://www.w3schools.com/html/html_styles.asp)
	9. [HTML Formatting](http://www.w3schools.com/html/html_formatting.asp)
	10. [HTML Quotations](http://www.w3schools.com/html/html_quotation_elements.asp)
	11. [HTML Comments](http://www.w3schools.com/html/html_comments.asp)
	12. [HTML Colors](http://www.w3schools.com/html/html_colors.asp)
	13. [HTML CSS](http://www.w3schools.com/html/html_css.asp)
	14. [HTML Links](http://www.w3schools.com/html/html_links.asp)
	15. [HTML Images](http://www.w3schools.com/html/html_images.asp)
	16. [HTML Tables](http://www.w3schools.com/html/html_tables.asp)
	17. [HTML Lists](http://www.w3schools.com/html/html_lists.asp)
	18. [HTML Blocks](http://www.w3schools.com/html/html_blocks.asp)
	19. [HTML Classes](http://www.w3schools.com/html/html_classes.asp)
	20. [HTML Layout](http://www.w3schools.com/html/html_layout.asp)
	21. [HTML Iframes](http://www.w3schools.com/html/html_iframe.asp)
	22. [HTML Head](http://www.w3schools.com/html/html_head.asp)
	23. [HTML Entities](http://www.w3schools.com/html/html_entities.asp)
	24. [HTML Symbols](http://www.w3schools.com/html/html_symbols.asp)
	25. [HTML URL Encode](http://www.w3schools.com/html/html_urlencode.asp)
 |
| 1. HTML concepts
 | * 1. Attributes
	2. Audio
	3. Block Colors
	4. Elements
	5. Entities
	6. Form
	7. Formatting
	8. Head
	9. Headings
	10. HTML Editors
	11. Images Tables
	12. Links
	13. Lists
	14. Media
	15. Object
	16. Paragraphs
	17. URL Encode
	18. Video
 |
| 1. Software
 | * 1. Macromedia Dreamweaver
	2. Microsoft Front page
 |
| 1. [HTML Media](http://www.w3schools.com/html/html_media.asp)
 | * 1. Macromedia Dreamweaver
	2. Microsoft Front page
 |
| 1. [HTML Graphics](http://www.w3schools.com/html/html_media.asp)
 | * 1. Google Maps
	2. Canvass
 |

**EVIDENCE GUIDE**

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| 1. Critical Aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Explained entities & attributes of HTML (hypertext mark-up language)
	2. Implemented HTML concepts
	3. Used [HTML form elements](http://www.w3schools.com/html/html_form_elements.asp)
	4. Used [HTML input types](http://www.w3schools.com/html/html_form_input_types.asp)
	5. Used [HTML input attributes](http://www.w3schools.com/html/html_form_attributes.asp)
	6. Used HTML Graphics
	7. Used [HTML Media](http://www.w3schools.com/html/html_media.asp)
	8. Describe the role of typography on the web.
	9. Explained entities & attributes of HTML (hypertext mark-up language)
 |
| 1. Underpinning Knowledge
 | * 1. HTML (Hypertext Mark-up Language) on a website
	2. [HTML forms](http://www.w3schools.com/html/html_forms.asp)
	3. Defining typography
	4. Different lettering styles
	5. The role of typography on the web
 |
| 1. Underpinning Skills
 | * 1. Implemented HTML concepts
	2. Used [HTML form elements](http://www.w3schools.com/html/html_form_elements.asp)
	3. Used [HTML input types](http://www.w3schools.com/html/html_form_input_types.asp)
	4. Used [HTML input attributes](http://www.w3schools.com/html/html_form_attributes.asp)
	5. Used HTML Graphics
	6. Used [HTML Media](http://www.w3schools.com/html/html_media.asp)
	7. Describe the role of typography on the web.
	8. Observing netiquette
	9. Portfolio Management
 |
| 1. Resource Implications
 | The following resources **MUST** be provided:* 1. PC or workstation
	2. HTML, editor
 |
| 1. Methods of Assessment
 | Competency may be assessed through:* 1. Demonstration
	2. Written examination
	3. Portfolio Assessment / training Certificates
	4. Interview
	5. Case Study/Situation
 |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	3. Assessment shall be observed while task are being undertaken whether individually or in-group
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***UNIT 7 DEVELOP WEBSITE USING CSS***

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| **UNIT CODE:** | SSTVET-ICT3407 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker required in CSS. It specifically includes the tasks of understanding CSS in an HTML document and elements. |

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| Elements & Performance Criteria  |

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| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Understand CSS in HTML document.
 | * 1. The basics of HTML was identified: elements, attributes, and other terms.
	2. CSS (Cascading Style Sheets) is understood.
	3. Role of CSS is explained.
 |
| 1. Apply CSS
 | * 1. [HTML forms](http://www.w3schools.com/html/html_forms.asp) are identified.
	2. CSS is applied
	3. Implemented the basic concepts of CSS.
	4. CSS box model and positioning is identified.
	5. CSS transition and gradients are explained.
	6. 2D/3D transformation and animation is applied.
	7. CSS Templates are used.
 |
| 1. Create CSS Layout
 | * 1. Apply “no layout”
	2. The following:
		1. the "display" property
		2. margin: auto;
		3. max-width
		4. the box model
		5. box-sizing
		6. position
		7. position example
		8. float
		9. clear
		10. the clear fix hack
		11. float layout example
		12. percent width
		13. media queries
		14. inline-block
		15. inline-block layout
		16. column
		17. flexbox
		18. CSS frameworks
 |
| 1. Work with SASS
 | * 1. Web responsiveness is applied.
	2. Understand SASS ([Syntactically Awesome Style Sheets](http://sass-lang.com/) )

 or style sheet language (LESS) * 1. Work with variables and nesting
	2. Experience with related tools.
 |

**Range of Variables**

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| 1. CSS
 | May Include:* 1. Apply Cascading Style Sheets (CSS)
	2. Implement the basic concepts of CSS such as:
	3. CSS Syntax
	4. Id & Class
	5. Styling of Backgrounds
	6. Text
	7. Fonts
	8. Links
	9. Lists and Tables
	10. CSS Border
	11. Outline
	12. Margin
	13. Padding
	14. Dimension
	15. Positioning
	16. Floating
	17. Align
	18. Colours
	19. Colour HEX
	20. Implement CSS usage:
	21. Macromedia Dreamweaver / Microsoft FrontPage
 |
| 1. CSS Layouts
 | * + 1. the "display" property
		2. margin: auto;
		3. max-width
		4. the box model
		5. box-sizing
		6. position
		7. position example
		8. float
		9. clear
		10. the clear fix hack
		11. float layout example
		12. percent width
		13. media queries
		14. inline-block
		15. inline-block layout
		16. column
		17. flexbox
 |

**EVIDENCE GUIDE**

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| 1. Critical Aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Explained entities & attributes of HTML (hypertext mark-up language)
	2. Implemented HTML concepts
	3. Used CSS
	4. Identified CSS box model and positioning, CSS transition and gradients.
	5. Applied 2D/3D transformation and animation.
	6. Used CSS Templates.
 |
| 1. Underpinning Knowledge
 | Understanding of the ff.:* 1. CSS (Cascading Style Sheets), role and concepts.
	2. CSS box model and positioning, CSS transition and gradients.
	3. 2D/3D transformation and animation.
	4. CSS Templates
	5. CSS designs:
		1. Apply “no layout”
		2. The following:
		3. the "display" property
		4. margin: auto;
		5. max-width
		6. the box model
		7. box-sizing
		8. position
		9. position example
		10. float
		11. clear
		12. the clearfix hack
		13. float layout example
		14. percent width
		15. media queries
		16. inline-block
		17. inline-block layout
		18. column
		19. flexbox
		20. CSS frameworks
		21. SASS (Syntactically Awesome Style Sheets or style sheet language (LESS)
		22. Work with variables and nesting
		23. Experience with related tools
 |
| 1. Underpinning Skills
 | * 1. Implemented CSS concepts
	2. Used [CSS form elements](http://www.w3schools.com/html/html_form_elements.asp)
 |
| 1. Resource Implications
 | The following resources **MUST** be provided:* 1. PC or workstation
	2. Implemented HTML concepts
	3. CSS
 |
| 1. Methods of Assessment
 | Competency may be assessed through:* 1. Demonstration
	2. Written examination
	3. Portfolio Assessment / training Certificates
	4. Interview
	5. Case Study/Situation
	6. Project Presentation
 |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	3. Assessment shall be observed while task are being undertaken whether individually or in-group
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***UNIT 8 DEVELOP WEBSITE USING JAVASCRIPT***

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| **UNIT CODE:** | SSTVET-ICT3408 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker required in JavaScript. It specifically includes the tasks of understanding JavaScript to program the behavior of web pages. |

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| Elements & Performance Criteria  |

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| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Understand JavaScript as a web programming language
 | * 1. JavaScript codes and structure is understood.
	2. JavaScript core components are identified
	3. The basic Java Scripting concepts are implemented.
	4. The display properties were used.
	5. Documents are tested.
	6. Create website animations and functionalities to assist in context explanations and adding visual appeal • Create and update JavaScript code to enhance a websites functionality, usability and aesthetics • Manipulate data and custom media with JavaScript • Create modular and reusable JavaScript code
	7. Libraries, frameworks and other systems or features with JavaScript are integrated.
 |
| 1. Apply JavaScript functions and events.
 | * 1. Demonstrate client side scripting language
	2. Implement JavaScript
	3. Implement the basic Java Scripting concepts such as JavaScript Statements
	4. JavaScript function and event.
	5. External scripts are used.
	6. JavaScript statements, code blocks, white space are applied.
	7. BOM (Browser Object Model) & DOM (Document Object Model) is described
	8. BOM & DOM are applied
	9. The JavaScript library was used.
 |
| 1. Demonstrate client side scripting language
 | 3.1 Usage of the JavaScript: * + 1. Objects
		2. Output
		3. Comments
		4. Variables
		5. Data Types
		6. Functions
		7. Operators
		8. Comparisons
		9. Conditions
		10. Switch
	1. Usage of jQuery:
		1. jQuery Selectors
		2. jQuery Events
		3. jQuery Hide/ Show
		4. jQuery Fade
		5. jQuery Slide
		6. jQuery Animate
		7. jQuery Stop Animations
		8. jQuery HTML Get Content and Attributes
		9. jQuery HTML Set Content and Attributes
		10. jQuery HTML Add Elements/Content
		11. HTML Remove Elements/Content
		12. jQuery Get and Set CSS Classes
		13. jQuery CSS () Method
		14. jQuery Dimensions
		15. jQuery Traversing Descendants
		16. jQuery Traversing Siblings
		17. Filtering and Filters
		18. jQuery Dimensions
 |
| 1. Understand responsive website and bootstrap framework
 | * 1. Responsive website is understood.
	2. The Advantages of responsive website is described
	3. Advantages of bootstrap in responsive website is described
	4. Work with bootstrap components to develop a responsive website
		1. Bootstrap is installed
		2. Bootstrap basic is described
		3. Thumbnail gallery and tabs are created and activated
		4. Bootstrap components is used to develop a responsive website
		5. Mockup is created and presented
 |
| 1. Understand content management concepts
 | * 1. Content management concepts, process and strategy are understood.
		1. Space
		2. Materials
		3. Equipment
		4. Movement
		5. Flow of information
	2. Models of Communication and Information are explained.
	3. Content Styles are understood.
	4. Varied Cases, examples are understood and analyzed.
	5. The benefits and limitations of open source Content Management Systems are understood.
	6. Suitable plugins/modules are chosen
	7. CMS web sites and client side functionalities are explored.
	8. Maintenance and updates to CMS plugins and modules for security are understood.
	9. SEO is understood.
	10. Social Media management is understood.
 |

Range of Variables

|  |  |
| --- | --- |
| 1. JQuery
 | May Include:* 1. jQuery Selectors
	2. jQuery Events
	3. jQuery Hide/ Show
	4. jQuery Fade
	5. jQuery Slide
	6. jQuery Animate
	7. jQuery Stop Animations
	8. jQuery HTML Get Content and Attributes
	9. jQuery HTML Set Content and Attributes
	10. jQuery HTML Add Elements/Content
	11. HTML Remove Elements/Content
	12. jQuery Get and Set CSS Classes
	13. jQuery CSS () Method
	14. jQuery Dimensions
	15. jQuery Traversing Descendants
	16. jQuery Traversing Siblings
	17. Filtering and Filters
 |
| 1. JavaScript core components
 | May Include:* 1. jQuery Selectors
	2. jQuery Events
	3. Variables
	4. Functions
	5. Loops
	6. Conditions
	7. Switches
	8. Objects
	9. Arrays
	10. Output Comments
	11. Data Types
	12. Functions
	13. Operators
	14. Comparisons
	15. Breaks
	16. Errors
	17. Validation
 |

**EVIDENCE GUIDE**

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| --- | --- |
| 1. Critical Aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Implement the basic concepts of CSS, HTML and JavaScript components.
	2. Testing is performed on web documents.
	3. Used JavaScript Library.
	4. Created website animations and functionalities to assist in context explanations and adding visual appeal
	5. Created and updated JavaScript code to enhance a websites functionality, usability and aesthetics
	6. Manipulated data and custom media with JavaScript
	7. Created modular and reusable JavaScript code
	8. Bootstrap framework is understood and used.
 |
| 1. Underpinning Knowledge
 | Understanding of the ff.:* 1. CSS (Cascading Style Sheets), role and concepts
	2. Selected JavaScript Library:
		1. Redux
		2. Redux-Saga to manage async I/O and isolate side-effects
		3. Next.js — SSR with Node & Express, automatic bundle splitting, styled-jsx
		4. Material UI
		5. Storybook
		6. Cheerio for unit testing React components
		7. Lodash ()
	3. Apply jQuery
		1. jQuery Selectors
		2. jQuery Events
		3. jQuery Hide/ Show
		4. jQuery Fade
		5. jQuery Slide
		6. jQuery Animate
		7. jQuery Stop Animations
		8. jQuery HTML Get Content and Attributes
		9. jQuery HTML Set Content and Attributes
		10. jQuery HTML Add Elements/Content
		11. HTML Remove Elements/Content
		12. jQuery Get and Set CSS Classes
		13. jQuery CSS () Method
		14. jQuery Dimensions
		15. jQuery Traversing Descendants
		16. jQuery Traversing Siblings
		17. Filtering and Filters
	4. Bootstrap Framework and components.
 |
| 1. Underpinning Skills
 | * 1. Implemented JavaScript concepts
	2. Coding Skills
	3. Creativity
 |
| 1. Resource Implications
 | The following resources **MUST** be provided:* 1. PC or workstation
	2. Implemented HTML concepts
	3. CSS
 |
| 1. Methods of Assessment
 | Competency may be assessed through:* 1. Demonstration
	2. Written examination
	3. Portfolio Assessment / training Certificates
	4. Interview
	5. Project Presentation
	6. Case Study/Situation
 |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	3. Assessment shall be observed while task are being undertaken whether individually or in-group.
 |

***UNIT 10 APPLY .NET TOOLS AND TECHNOLOGIES***

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| **UNIT CODE:** | SSTVET-ICT3410 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker required in .NET Development. It specifically includes the tasks of understanding applications using .NET Framework 4.5 (or higher) tools and technologies. The focus will be on coding activities that enhance the performance and scalability of the Web site application. The Model View Controller (MVC) architectural pattern will be explained in this course. ASP.NET MVC will be introduced and compared with Web Forms so that students know when each should/could be used. |

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| Elements & Performance Criteria  |

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| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Introduction to .NET technologies and architecture
 | * 1. The .NET Framework applications is described and the features that Visual Studio 2013 or higher and programming
	2. NET technologies and architecture are described, according to:
		1. Microservices
		2. .NET Applications
		3. Cloud Applications
		4. ASP.Net web Apps
		5. Mobile apps
		6. UWAS Mobile apps
 |
| 1. Perform Object-oriented programming with C#
 | * 1. The basic data types, operators, and expressions are used C#
	2. Standard programming language constructs is used.
	3. Create and invoke methods, pass parameters to methods, and return values from methods are used.
	4. Overloaded methods are created and optional & output parameters are used.
	5. Exceptions are catch and handled and information are written to the event log.
	6. Requirement for implementing logging, tracing, and profiling is explained when building large-scale applications.
	7. Custom classes are created and used.
	8. Custom interfaces are defined and implemented.
	9. Generics are used to implement type-safe collections.
	10. Abstract classes and inherit are defined from base classes to create a class hierarchy.
	11. Inherit from .NET Framework classes and extension methods are used to add custom functionality to the inherited class.
	12. Generic classes and methods are created
 |
| 1. Identify working principle of ASP.Net web form
 | * 1. Review Web design fundamentals.
	2. Understand ASP.Net web form life cycle
	3. Explain the Dot Net Framework
	4. Implement software development life cycle (SDLC) phases in a web project
	5. Design interface of a website in a web designing software
	6. Develop a static or dynamic website in a web development software
	7. Understand user management in ASP.Net application
 |
| 1. Make UI layout for information entry and view.
 | * 1. Understand user control
	2. Apply the **Server Controls**
	3. Make UI layout for entry information.
	4. Make a web application for keeping and searching information using more than two layer architecture concept
	5. Identify **different views** of a web page
	6. Execute the **Data Controls**
 |
| 1. Apply the basic terminologies of MVC (model–view–controller)
 | * 1. Vocabularies of ASP.Net MVC is identified
	2. Basic terminologies of MVC is described
	3. Controller and Action is demonstrated
	4. Razor Syntax is used
	5. **Razor helpers** are used
 |
| 1. Develop ASP.NET Web Applications.
 | * 1. introduction to Content Management System (CMS)
	2. Introduce the .NET Framework and technologies
	3. The ***Microsoft Web Technologies stack*** is described.
	4. Appropriate technology is selected to use to develop any given application.
	5. ***Architecture of web application*** is designed to meet a set of functional requirements, user interface requirements, and address business models.
	6. The implementation of a web application that will meet a set of functional requirements, user interface requirements, and address business models is designed.
	7. MVC Modelsare***created***.
	8. Code that implements business logic within Model methods, properties, and events is written.
	9. ***Controllers*** to an MVC Application is added to manage user interaction
	10. Models are updated.
	11. Select and return Views.
	12. Razor syntax is used to ***create Views*** in an MVC application that display
	13. Data is edited.
	14. Interact with Models and Controllers
 |
| 1. Test, debug and create web applications.
 | * 1. Unit tests and debugging tools are ran against a web application in Visual Studio
	2. An application for troubleshooting is configured.
	3. A web application that uses the ASP.NET routing engine to present friendly URLs is developed.
	4. A web application that uses the ASP.NET routing engine to a logical navigation hierarchy to users is developed.
	5. Template Views are used.
	6. A Consistent Look and Feel is applied to an MVC Application
	7. Web Pages for Different Browsers are adapted
	8. Partial page updates and caching are used to reduce the network bandwidth used by an application
	9. Accelerate responses to user requests is performed.
	10. JavaScript code that runs on the client-side is written
	11. JQuery script library is utilized to optimize the responsiveness of an MVC web application.
	12. Authentication is implemented in an MVC web application using Membership Provider.
	13. Authorization is implemented in an MVC web application using Role Provider.
	14. A secure MVC application that resists malicious attacks is built.
	15. An MVC application that persist information about users and preferences is built.
 |
| 1. Create and define web APIs
 | * 1. A Web API is described
	2. Why developers might add a Web API to an application is identified and explained.
	3. RESTful web API is built and consumed from other applications.
	4. Modifying the way browser requests are handled by an MVC application using ***HTTP modules and HTTP handlers***.
	5. Request from browser using web sockets is intercepted.
	6. ***Windows Azure web service*** is written
	7. Code written to call the web service from and MVC application.
	8. An ASP.NET MVC 5 or higher web application from a development computer is packaged to a web server ***for staging or production***
	9. An ASP.NET MVC 5 or higher web application from a development computer is deployed to a web server for staging or production
 |
| 1. Utilized ASP.Net MVC
 | * 1. Database in ASP.Net MVC is used
	2. JavaScript and JQuery in ASP.Net MVC used
	3. DbContext and DbSet in ASP.Net MVC introduced
	4. JavaScript and jQuery in ASP.Net MVC is introduced.
 |
| 1. Work with Database Model and View
 | * 1. Database model is described
	2. Database model binding is viewed
	3. Model to model mapping and editing viewed
	4. Multiple model is used
	5. Application for user sign up, sign in, sign out is made
 |

Range of Variables

|  |  |
| --- | --- |
| 1. Content management (CM)
 | May Include:* 1. Collection, retrieval, governance and over-all management of format
 |
| 1. Format
 |  * 1. UML Format
 |
| 1. Microsoft web technologies stack
 | 3.1 ASP.NET web technologies stack may include :* + 1. Personalization
		2. Membership
		3. Roles
		4. Data Sources
		5. Site Map
		6. Resource
		7. Security
 |
|  |  |
| 1. Architecture of web applications
 | *This may include the following:** 1. Planning Models
	2. Planning Controllers
	3. Planning Views
	4. Architecting an MVC Application
 |
| 1. Create MVC Models
 | *Creating MVC Models may include:** 1. Creating an MVC Project and Adding a Model
	2. Creating a New SQL Azure Database in Visual Studio
	3. Adding Properties and Methods to MVC Models
	4. Using Display and Edit Annotations in MVC Models
 |
| 1. Add Controllers
 | *This may include the following:** 1. Adding an MVC Controller and Writing the Actions
	2. Writing the Action Filters in a Controller
 |
| 1. Create Views
 | *This may include the following:** 1. Adding a View for Web Page Display
	2. Creating and Using a Partial View
	3. Testing the Views
 |
| 1. Accelerate Responses
 | *This may include the following:** 1. Choose a state management mechanism (in-process and out of process state management)
	2. Plan for scalability; use cookies or local storage to maintain state
	3. Apply configuration settings in web.config file
	4. Implement session less state (for example, QueryString)
	5. Implement page output caching (performance oriented)
	6. Implement data caching; implement HTTP caching
	7. Read and write string and binary data asynchronously (long-running data transfers)
	8. Choose a connection loss strategy
	9. Decide a strategy for when to use Web So*ckets*
 |
| 1. Optimize the responsiveness
 | This may include the following:* 1. Implement client validation with JQuery
	2. Use JavaScript and the DOM to control application behavior
	3. Extend objects by using prototypal inheritanceUse AJAX to make partial page updates
	4. Implement the UI by using JQuery
 |
| 1. Authentication
 | This may include the following:* 1. Configuring Authentication and Membership Provider
	2. Authenticate users
	3. Enforce authentication settings
	4. Choose between Windows, Forms, and custom authentication
	5. Manage user session by using cookies
	6. Configure membership providers
	7. Create custom membership providers
	8. Building the Logon and Register Views
	9. Building a Password Reset View
 |
| 1. Secure MVC Web Application
 | *This may include the following:** 1. Secure communication by applying SSL certificates
	2. Salt and hash passwords for storage
	3. Use HTML encoding to prevent cross-site scripting attacks (ANTI-XSS Library)
	4. Implement deferred validation and handle unvalidated requests, for example, form, querystring, and URL
	5. Prevent SQL injection attacks by parameterizing queries
	6. Prevent cross-site request forgeries (XSRF)
 |
| 1. Malicious Attacks
 | *This may include the following:** 1. Cross-site scripting
	2. SQL injection
 |
| 1. HTTP Modules and HTTP Handlers
 | *This may include the following:** 1. Implement synchronous and asynchronous modules and handlers
	2. Choose between *modules and handlers in IIS*
 |

**EVIDENCE GUIDE**

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| --- | --- |
| 1. Critical Aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Over-all CMS concepts and technologies are understood.
	2. Content Are development and published
	3. CMS Maintenance is performed.
	4. Website and content are published.
	5. Vocabularies of ASP.Net MVC
	6. Basic terminologies of MVC
	7. Method of using razor syntax
	8. Method of using use razor helpers
	9. Introduction to DBcontext and DBset in ASP.Net MVC
	10. Introduction to JavaScript and JQuery in ASP.Net MVC
	11. Method of describing about the model
	12. Method of using of multiple model
 |
| 1. Underpinning Knowledge
 | Understanding of the ff.:* 1. Object-oriented C#
	2. Benefits and limitations of open source Content Management Systems
	3. Finding, choose and implement suitable plugins/modules
	4. Implementing client side functionalities to CMS web sites
	5. Understanding maintenance and updates to CMS plugins and modules for security
	6. Understanding the stages of CMS Life cycles:
		1. Organization
		2. Creation
		3. Storage
		4. Workflow
		5. Editing/Versioning
		6. Publishing
		7. Removal/Archives
 |
| 1. Underpinning Skills
 | * 1. Implemented programming, server side development
	2. Coding Skills
	3. Creativity
	4. Demonstrate Controller and Action
	5. Use Razor Syntax
	6. Use Razor helpers
	7. Use Database in ASP.Net MVC
	8. Use JavaScript and JQuery in ASP.Net MVC
	9. Introduce DbContext and DbSet in ASP.Net MVC
	10. JavaScript and jQuery in ASP.Net MVC is introduced.
	11. View model to model mapping and editing
	12. Use of multiple model, Make an application for user sign up, sign in, sign out
 |
| 1. Resource Implications
 | The following resources **MUST** be provided:* 1. PC or workstation
	2. Software, Installers, Internet connection
 |
| 1. Methods of Assessment
 | Competency may be assessed through:* 1. Demonstration
	2. Written examination
	3. Portfolio Assessment / training Certificates
	4. Project Presentation
	5. Rubrics
 |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	3. Assessment shall be observed while task are being undertaken whether individually or in-group.
 |

***UNIT 10 WORK WITH DATABASE MY SQLSERVER***

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| **UNIT CODE:** | SSTVET-ICT3410 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker required in database: my SQL server. It specifically includes the tasks of discussing the basics of databases, differentiating different Database Management Systems (DBMS), creating database of a Website in a Database Management System and Create and use stored procedure. |

|  |
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| Elements & Performance Criteria  |

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| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Discuss the basics of databases
 | * 1. The equipment and software are prepared as per workplace requirement.
	2. Basic database concepts are recognized
	3. The necessity of relational database for keeping user data is understood
	4. The difference between free database and licensed database is identified
	5. The role of database in web applications is spelled out
 |
| 1. Explore Databases Management Systems (DBMS)
 | * 1. The quality of work was ensured.
	2. options and features of different database management systems is compared
	3. Different database management systems are Installed
	4. Entities and their attributes from a real life scenario are discovered
	5. The relationship between entities and their attributes to draw an E-R diagram is Defined
 |
| 1. Create a DBMS for a website
 | * 1. A database of a web project is designed
	2. Indexing and cascading to the database is implemented
	3. The data is manipulated.
	4. The reports are generated
	5. SQL queries to retrieve data are written
 |
| 1. Use stored procedure
 | * 1. An introduction procedure in database is stored
	2. Describe Stored procedures functionality encapsulated
	3. Users from data tables are isolated
	4. A security mechanism is provided
	5. A different database management system is migrated
	6. Stored procedure is called, modified and deleted
 |
| 5.Implement SQL | * 1. Demonstrate server side scripting language use.
	2. A standard language for accessing and manipulating databases such as SQL is understood.
	3. SQL Environment and Syntax or codes are applied and used:
		1. SQL Syntax
		2. SQL Select
		3. SQL Where
		4. SQL Where
		5. SQL And, Or, Not
		6. SQL Order By
		7. SQL Insert Into
		8. SQL Null Values
		9. SQL Update
		10. SQL Delete
		11. SQL Select Top
		12. SQL Min and max
		13. SQL Count, Avg, Sum
		14. SQL Like
		15. SQL Wildcards
		16. SQL In
		17. SQL Joins, Unions, Other Commands
		18. MySQL Functions
	4. SQL Database
		1. SQL Create DB
		2. SQL Drop, Create Table, Drop Table, Alter Table
		3. SQL Constrains, Not Null, Uniquw, keys (Primary, Foreign)
		4. SQL Check, hosting, etc.
		5. SQL Views, Index, Auto Increment
 |
| 6. Apply SQL and web security. | * 1. MySQL databases are designed and implemented.
	2. FTP (File Transfer Protocol) server and client relationships and software packages are understood.
	3. Data exchange between server and client systems are understood.
	4. Software design patterns are applied.
	5. Web application security are understood and applied.
 |

**Range of Variables**

|  |  |
| --- | --- |
| 1. Database basics
 | * 1. Row
	2. Column
	3. Table
	4. Relationship
	5. Queries
	6. Normalization
	7. Database
	8. Relational Database
	9. Management System
	10. Primary Key
	11. Foreign Key
	12. Indexing
	13. Entity Relationship Diagram
 |
| 1. DBMS
 | * 1. Microsoft Access
	2. Microsoft SQL Server
	3. Microsoft SQL
 |
| 3. Database design and structure | * 1. Tables
	2. Creation of Entity Relationship Diagram
	3. Normalization of the Entity Relationship Diagram
	4. De-normalization of the Entity Relationship Diagram
 |
| 4. Data and Database manipulation  | * 1. Create schema
	2. Create table
	3. Create report
	4. Insert data
	5. Select data
	6. Delete data
	7. Update data
	8. Filtering data
	9. Retrieve data
 |

**EVIDENCE GUIDE**

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| 1. Critical Aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Discussed the basic database concepts
	2. Installed different database management systems
	3. Created Database of a Website in a Database Management System.
	4. Created and used stored procedure
	5. Generated the reports
	6. Provided a security mechanism to stored procedure
	7. Implement My SQL
 |
| 1. Underpinning Knowledge
 | * 1. Database Concepts, objects
	2. DBMS
	3. Data Manipulation
	4. Database design
	5. Implement SQL Environment and Syntax or codes are applied and used:
		1. SQL Syntax
		2. SQL Select
		3. SQL Where
		4. SQL Where
		5. SQL And, Or, Not
		6. SQL Order By
		7. SQL Insert Into
		8. SQL Null Values
		9. SQL Update
		10. SQL Delete
		11. SQL Select Top
		12. SQL Min and max
		13. SQL Count, Avg, Sum
		14. SQL Like
		15. SQL Wildcards
		16. SQL In
		17. SQL Joins, Unions, Other Commands
		18. MySQL Functions
	6. SQL Database
		1. SQL Create DB
		2. SQL Drop, Create Table, Drop Table, Alter Table
		3. SQL Constrains, Not Null, Uniquw, keys (Primary, Foreign)
		4. SQL Check, hosting, etc.
		5. SQL Views, Index, Auto Increment
 |
| 1. Underpinning Skills
 | * 1. Preparing equipment and software as per workplace requirement
	2. Checking equipment and software for conformance and usability
	3. Determining output to be generated in accordance with job requirements/specifications
 |
| 1. Resource Implications
 | The following resources **MUST** be provided:* 1. PC or workstation
	2. Workplace (simulated or actual)
	3. Personal computer/laptop
	4. Application software
	5. Pens
	6. Paper
	7. Instruction sheet/manual.
	8. Workplace (simulated or actual)
	9. Personal computer/laptop
	10. Pens
	11. paper
	12. instruction sheet/manual
	13. Graphics and animation software, video editor, etc.
 |
| 1. Methods of Assessment
 | Competency may be assessed through:* 1. Demonstration
	2. Written examination
	3. Portfolio Assessment
	4. Interview
	5. Case Study/Situation
 |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment.
	2. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	3. Assessment shall be observed while task are being undertaken whether individually or in-group
 |

 ***UNIT 12 LEAD SMALL TEAMS IN THE ICT WORKPLACE***

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| **UNIT CODE:** | SSTVET-ICT3312 |
| **UNIT DESCRIPTOR:**  This unit of competency requires the knowledge, skills and attitude of a worker to lead and develop small teams to achieve designated assignment instructions or goals, and to set and maintain team and individual or team standards, facilitate open communication and resolve team concerns.  |

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| Elements & Performance Criteria  |

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| **ELEMENTS** | **PERFORMANCE CRITERIA***(Italicized items are elaborated in the range of variables).* |
| 1. Facilitate team planning
 | * 1. English communication is applied in the workplace.
	2. Work information and requirements are identified and presented to team members
	3. The purpose of instructions and requirements are relayed or properly communicated to team members
	4. he team members’ queries and concerns are recognized, discussed and dealt with
 |
| 1. Assign responsibilities
 | * 1. Individual and team purpose, roles, duties, and responsibilities are clarified and delegated in consideration with the skills, knowledge and aptitude needed for the delivery of the assigned task, and in according to company policies, goals and objectives.
	2. The duties are assigned having regard to individual preferences, as well as domestic and personal considerations, whenever possible.
 |
| 1. Set performance expectations for team members
 | * 1. Team effort is rewarded and support provided to develop mutual concern and camaraderie and to maximize benefit from team diversity.
	2. Performance expectations are established based on client needs and according to assignment requirements
	3. Performance expectations are based on individual team members duties and area of responsibility
	4. Performance expectations are discussed and disseminated to individual team members
 |
| 1. Monitor team performance
 | * 1. The duties, rosters and responsibilities are assesses against a matched team capabilities in accordance with legislative and organizational requirements.
	2. The team members are provided with feedback, positive support and advice on strategies to overcome any deficiencies
	3. Performance issues which cannot be rectified or addressed within the team are referenced to appropriate personnel according to employer policy.
	4. Constructive feedback on quality of performance is regularly provided to team members for integration into work practice.
	5. Team concerns are acknowledged and addressed as required and wherever possible discussed and resolved within the team
	6. The team’s operations are monitored to ensure that employer/client needs and requirements are met
 |

**Range of Variables**

|  |  |
| --- | --- |
| 1. Work requirements
 | * 1. Job description
	2. Assignment instructions
	3. Client Profile
 |
| 1. Team member’s concerns
 | * 1. Roster/shift details
	2. Work Schedule
 |
| 1. Monitor performance
 | * 1. Formal process of evaluative information and corrective action
	2. Informal process
 |
| 1. Feedback
 | * 1. Formal process of providing
	2. Informal process
 |
| 1. Performance issues
 | * 1. Work output
	2. Work quality
	3. Team participation
	4. Compliance with workplace **Protocols**
	5. Safety
	6. Customer service
 |

**EVIDENCE GUIDE**

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| 1. Critical Aspects of Competency
 | Assessment requires evidence that the candidate:* 1. Clearly defined and communicated les and responsibilities, assignment instructions and organizational goals and objectives to individual and team members. Maintained or improved individuals and/or team performance given a variety of possible scenario
	2. Assessed and monitored team and individual performance against set criteria.
	3. Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf
	4. Assigned duties and responsibilities, having regard to individual’s knowledge, skills and aptitude and the needs of the tasks to be performed
	5. Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members
 |
| 1. Underpinning Knowledge
 | * 1. Knowledge and understanding of Company policies and procedures
	2. Relevant legal requirement
	3. How performance expectations are set
	4. Methods of Monitoring Performance
	5. Client expectations
	6. Team member’s duties and responsibilities
 |
| 1. Underpinning Skills
 | * 1. Communication skills required for leading teams
	2. Informal performance counseling skills
	3. Team building skills
	4. Negotiating skills: conflict resolution and negotiation techniques
	5. Use coaching and mentoring skills to provide support and build effective workplace relationship
	6. Interpersonal techniques including active listening
	7. Accurately maintain records and documentation.
 |
| 1. Resource Implications
 | The following resources **MUST** be provided:* 1. Access to relevant workplace or appropriately simulated environment where assessment can take place
	2. Materials relevant to the proposed activity or task
 |
| 1. Methods of Assessment
 | Competency may be assessed through:* 1. Direct observations of work activities of the individual member in relation to the work activities of the group
	2. Observation of simulation and/or role play involving the participation of individual member to the attainment of organizational goal
	3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
 |
| 1. Context of Assessment
 | * 1. Competency assessment may occur in workplace or any appropriately simulated environment
	2. Context for Assessment
	3. Competency may be assessed on the job or simulated environment:
	4. Competency may be assessed in workplace or in a simulated workplace setting
	5. Assessment shall be observed while task are being undertaken whether individually or in group.
	6. Assessment must be undertaken in accordance with Lao PDR CBT Assessment guidelines
	7. Assessment shall be observed while task are being undertaken whether individually or in-group
 |

# List of Tools and Equipment

1. **Hardware (Class size: 20 trainees/student)**

|  |  |  |
| --- | --- | --- |
| **Sr. No.**  | **Name of Equipment / Tools**  | **Qty.**  |
| 1. | Laptop: Latest Processor with licensed Operating System and Antivirus.  | 1 |
| 2. | File server  | 1 |
| 3. | LAB should have Structured cabling  | 1 |
| 4. | Workstation/ Nodes (computer) with wired and wireless card (built-in) | 20 |
| 5. | Workstation for Multimedia  | 1 |
| 6. | 24 Port switch with wireless connectivity  | 1 |
| 7. | RJ 45 Connectors  | 1 |
| 8. | Internet or Intranet Connectivity  | 1 |
| 9. | On-Line UPS  | 1 |
| 10. | Printer  | 1 |
| 11. | Scanner  | 1 |
| 12. | Web cam (digital camera)  | 20 |
| 13. | DVD or BLU-RAY Disc | 2 |
| 14. | Pen-drive  | 20 |
| 15. | External Hard disks  | 4 |
| 16. | DSL Wireless Router  | 1 |
| 17. | Wireless Router  | 5 |
| 18. | Wireless LAN Card  | 20 |
| 19. | LCD Projector  | 2 |
| 20. | Well equip computer lab with Multimedia Projector  | 1 |
| 21. | Well equip class room with Multimedia Projector  | 1 |
| 22. | Tool box  | 5 sets |
| 23. | USB Floppy Drive  | 1 |
| 24. | Network Switch | 5 |
| 25. | Router | 5 |

1. **Software**
	1. Professional Office (MS Office, Open Office)
	2. Text, Word processor, C compiler
	3. Antivirus Software - Server Edition for Servers and Client Edition for Workstations
	4. Operating System (Windows, Linux)
	5. Web/Internet Browsing software
	6. Java, C#, ASP.NET, Visual Studio
	7. Graphics Software (MS Paint, Open Office, Other )
	8. Online Application Software
	9. Visual Studio.Net (Latest version) OR Visual Web Developer (Latest version)
	10. PHP (Latest version)
	11. PHP Storm (Latest version)
	12. MySQL and SQL Server (Latest version)
	13. Macromedia Dreamweaver (Latest version)
	14. Adobe Muse (Latest version)
	15. Adobe Photoshop (Latest version)
	16. Microsoft FrontPage & Microsoft Publisher (Latest version)
	17. Microsoft Office (Latest version

NOTE: Latest version of hardware and software should be provided.

Developed by:

**DR. Mayra Christina M. Ambrocio**

Skills Standards, Curriculum and Training Material Development Expert

IT Electronics/Multimedia and Graphic Design/IT Networking (International)

Annex:

## Competency Standard Development Team

***SSTVET Project***

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Name and Surname | Organization/Company | Job Expert |
|  | DR. MAYRA CHRISTINA M. AMBROCO | SSTVET Project | International Consultant in Information Technology  |
|  | MR. NGAVISETH PHOMVHONGSA | VIENTIANE-HANOI FRIENDSHIP TECHNICAL VOCATIONAL COLLEGE (VHFTVC) | National Consultant in Information Technology |

***Resource Person / Methodologist***

|  |  |  |  |
| --- | --- | --- | --- |
|  | MR.BOUNTHAM SITTHIMANUOTHAM | SSTVET Project  | M&E Specialist |
|  | MS. SOMPHALANG NGONPHETSY | VEDI | Head of Curriculum Development Section |
|  | MRS. ANGKHASAYA SISOUPHANH | TVED, MoES | Deputy of M&E Division |

***Resource Persons / Company & Industry***

|  |  |  |  |
| --- | --- | --- | --- |
|  | MR. KHAMLA SOURIYASACK | APIS | General Manager |
|  | MR. SORADETH VORAVONG | DATACOM | Head of Sales |
|  | MR.PONGSATHORN RATCHADAPISIT | CISCO SYSTEM | Account Manager |
|  | MR. CHANTHIUM RATHAHAO | SISAVATH PRINTING PRESS | Managing Director |
|  | MR. PHANTHASONE SITHISACK | LAOTELECOM | IT Engineer |
|  | MR. NAJIB RAHMAT | WIMPELCOM LAO CO. LTD. | Senior IT Infrastructure and Financial Systems Manager |
|  | MS. VILAYSONE | MAHAXAY  |  HR Oficer |
|  | MR.ALEXSAY SYPHONE | LAOCERT |  IT Officer |

***Resource Persons / Public & Private TVET Institutions***

|  |  |  |  |
| --- | --- | --- | --- |
|  | MS. DAVONE KOMMANIVONE | VOCATIONAL EDUCATION DEVELOPMENT INSITUTE (VEDI) | Teacher – IT Department |
|  | MR. SONEXAY PHANTHAVONG | VIENTIANE-HANOI FRIENDSHIP TECHNICAL VOCATIONAL COLLEGE (VHFTVC) | Deputy Director  |
|  | MR. SENGALOUN THAMMAVONGSA | VIENTIANE-HANOI FRIENDSHIP TECHNICAL VOCATIONAL COLLEGE (VHFTVC)) | Teacher – IT Department |
|  | Mr. KHOUNMY SOUVANTHA | PAKPASAK TECHNICAL COLLEGE (PSTC) | Teacher – IT Department |
|  | MR. VONGDAOPHETH RASABOUTH | PAKPASAK TECHNICAL COLLEGE (PSTC) | Teacher – IT Department |
|  | MS. MALOYEE PHOUMYASEN | VIENTIANE PROVINCE | Teacher – IT Department |
|  | MR.THAVONE PHONNOUNSY | SAVANNAKHET TECHNICAL VOCATIONAL COLLEGE (STVC) | Teacher – IT Department |
|  | MR. SOUKOUTHAI KEOMANISAY | SAVANNAKHET TECHNICAL VOCATIONAL COLLEGE (STVC | Teacher – IT Department |
|  | MR. SYTHONG BOUNCHALEUN | POLYTECHNIC COLLEGE (PTC) | Teacher – IT Department |
|  | MR.KHANSAVANG CHANTHACHACK | CHAMPASAK TECHNICAL VOCATIONAL COLLEGE (CTVC) | Vice Director |
|  | MR.THONECHANH PHOTHISAN | CHAMPASAK TECHNICAL VOCATIONAL COLLEGE (CTVC) | Teacher – IT Department |
|  | MR. SAYSOMBATH VONGPHOUSAY | CHAMPASAK TECHNICAL VOCATIONAL COLLEGE (CTVC) | Teacher – IT Department |