Faculty of Information Technology

University of Moratuwa

Degree of Bachelor of Information Technology (BIT)External

Course Outline

ITE 2722 : Web Programing

Course Introduction

The web programing has been behind the success of most disruptive innovations-based business solutions in this era. It is commonly used in modern business industry as a medium for doing operations with internal and external entities in the modern world through variety of devices. When programmers have to face the challenges given by the ever-increasing demand for the smart applications and disruptive innovations emerge within the society. Web programing has revolutionized the industries by enabling their operations through convergence of technologies in form of both hardware and software, integration of multiple tiers with variety of stakeholders, autonomous and continuous availability, agility and creation of global market place. The advances of web technologies, services and enabling tools are providing developers new dimensions to build desired web application to gear the communication and operations in interactive systems.

This module has been designed to empower web programing skill and knowledge of students by toping up on client-side application development and build necessary abilities on server-side programing. It focuses on various server-side communication and application programing concepts in the IT industry and gives hand on experience to use industry ready tools and libraries in developing Rich Web Applications (RIA). After completion of this module the learner will obtain skills and knowledge which is core and compulsory for an IT graduate.

Course Outline

Module Code	ITE 2722	Title	Web Programing		
No of Credits	4	**Course Type**	**Compulsory** ■	**Elective** ☐	
Pre-requisites			**Co-requisites**		

Student hours (Total notional learning hours):
- Reading - 28
- Self-study - 100
- Browsing the internet for information - 56

Course Learning Outcomes	Aligned programme learning outcome (No)
Upon successful completion of this course, students will be able to: 1. Implement a dynamic webpage using server-side scripting. 2. Use server side scripting language constructs, conditions statements, loops, arrays, strings, functions, files, IO, and objects, in programming a webpage. 3. Integrate SQL database with the webpage programmed in	

server side scripts.
4. Describe the three-tire architecture and MVC framework in the perspective of a web programmer.
5. Use web programing libraries and frameworks.

After completion of this module, learner will be able to describe web programing concepts with underlying technologies and to effectively apply industry-oriented server-side web programing and development tools to develop rich web applications.

Topic	Contents/Fundamental Concepts
1. Introduction to web architectures 2. Introduction to server side scripts 3. syntax, variables and operators 4. conditional statements, control structures and loops 5. Arrays, strings associated operators 6. Work with GET and POST 7. Files and IO operations 8. Functions, cookies and Global Variables 9. Objects and operations 10. Revisiting the three-tier architecture 11. Database connectivity, Database operations and SQL execution 12. MVC framework	• Introduction to web communication and three tier architectures • Sever-side programs and introduction to PHP • Basics of PHP programing • PHP Programing constructs • PHP built-in functions and classes • Form data processing and Input/output operations • I/O file handling and cookies • String processing and regular expressions • Business logic operations and data tier • PHP and MySQL connectivity • Web Database operations • Web Database Manipulation with SQL • Session Handling • Ritch Internet Applications with AJAX • AJAX with PHP • Web application development frameworks

Course Teaching Learning Activities

Course Teaching Learning Activities	Aligned course learning outcome (No)
1. Study the reading materials and additional references 2. Survey and examine techniques used in web-based business applications 3. Perform exercises on web programing 4. Perform Practical Assignments on web programing 5. Use industrial frameworks to develop web application systems	

Assessment Plan
Assessment plan must be matched to the desired LO's. You need to consider what and how the assessment task(s) are able to help to students achieve the desired LO's.

Assessment Method	Description	Weight	Aligned course learning outcome (No)

	Continuous Assessments
	
	   Assignments/Practical (02 No. s): 40%
	
	Eligibility to sit the final examination
	   Continuous Assessments: 40%
	
	Final Evaluation		

	Final Examination : 60% Continuous Assessment: 40% In order to ensure 'self-involvement' of students in continuous assessments, the materials tested in continuous assessments will also be examined in the final examination.		

Required and Recommended Readings

A well-structured set of learning resources should be provided to students. These are usually in the form of reading lists and references. They may also include sets of links to online resources and eBooks. It is often helpful to separate these resources into ones which are central to the content and desired learning outcomes of the course (required readings), and those which are relate to extensions of areas of the course (recommended readings). One needs to be realistic about the amount of reading material students are likely to delve into. Overly long reading lists can be counterproductive and discourage students.

Required Readings:
Accompanied lessons and study materials given in this online course

Recommended Readings:
Internet & Worldwide web How to program, Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, 5th Edition, Pearson Education Publications

Contact details for teacher(examiner/writer)

Help students to easily locate your contact information. The information allows students to arrange for any consultation after classes or receive support in terms of learning and teaching from teacher, tutors and/or teaching assistants. It is better to put both the teachers' and TAs' contact details such as name, office location, phone number and email address.

Resource person: Name: Dr. L. Ranathunga (Detailed lesson plan)

Office Location: Department of IT

Telephone: +94112650 301 - 8102

Email: lochandaka@uom.lk

Detailed Syllabus

Week 01: *Lesson 1 –* **Introduction to web architectures**

Introduction:

During this week students will get an introduction to web architectures. This week provides an overview of the web communication through multi-tier architectures and modern web applications. Students will also learn different programming models, operational layers, communication concepts, back-end programs and building blocks of web-based business solution. The server-side programming concept will also be discussed during this week.

Learning Outcomes for Week 01:

After completion of this lesson, the learner will be able to describe different types of web applications and systems with their stages and operations.

- **Describe client server communication**
- **Describe the stages of web application operations**
- **Describe distinguish building blocks of a web-based business solution**
- **Describe three-tier architecture**
- **Compare and contrast operational differences of each tier**
- **Compare and contrast client-side and server-side application programs**

  Lesson Outline:

- Recall web communication model
- Client server architecture
- Modern web applications and systems
- Three-tier architecture and multi-tier architectures
- Operation of application logic tier
- Data tier and operation on data tier
- Client-side programs and server-side program models
- Components of server-side program languages

Assignment: *none*

Other Activities:

Reading references: https://www.youtube.com/watch?v=ibEd2Tajrk8

Self-Assessments:

- Survey on business operation on web
- Survey on web forms and applications

Week 02: Lesson 2 - Server-side Programing and introduction to PHP

Introduction:

During this week students will learn the features of server-side programing compared with client-side programing. Students will use PHP as a server-side programing language.

Learning Outcomes for Week 02:

After completion of this lesson, the learner will be able to explain the features of serve-side programing language and write preliminary server-side script by using PHP.

- Describe the features of server-side script
- List common server-side languages and their applications
- Describe PHP as interpreted scripting language
- Write message displaying programs by using PHP
- Describe operational stages of server-side script by using PHP

Lesson Outline:

- What is a server-side script?
- Operation of Server-side script
- Common server-side programing languages and their usage
- Interpreted and compiled languages
- Introduction to PHP
- Writing first PHP program
- Difference of the output of sever-side script and client-side script

Assignment:

Self Assessments

Describe different server-side languages, their categories and applications.

Other Activities:

Extra References: https://developer.mozilla.org/en-US/docs/Learn/Server-side/First_steps/Introduction

         https://www.w3schools.com/php/php_intro.asp

Week 03: Lesson 3 – Basics of PHP Programing

Introduction:

During this week students will learn PHP as a web programing language. Students will also discuss about server-side concepts behind the PHP. The students will use simple text pad or web development IDE as a startup-coding environment. Fundamental programing elements of PHP will be delivered in this lesson.

Learning Outcomes for Week 03:

After completion of this lesson, the learner will be able to write basic PHP programs and evaluate the outputs.

- Describe the main building blocks of a PHP code
- Write PHP codes with basic coding components
- Describe the main syntax of a PHP script
- Apply PHP data variables with dynamically typed behavior
- Write HTML codes inside PHP

Lesson Outline:

- Introduction to PHP web programing language
- Main elements of a PHP code
- Fundamental built-in PHP functions
    - print, echo etc.
- PHP Variables
- Dynamically typed variables
- Writing HTML codes inside PHP

Assignment:

Write a web program with your personal information only by using php code.

Other Activities:

Extra References:

https://www.w3schools.com/php/php_syntax.asp

Week 04: Lesson 4 - PHP Programing constructs

Introduction:

During this week Students will learn to use PHP programing constructs and apply them appropriately. This lesson will recall the fundamental building blocks of programing languages based on PHP language. The lesson will be followed by a self-assessment exercises.

Learning Outcomes for Week 04:

After completion of this lesson, the learner will be able to use fundamental programing building blocks by using PHP.

- Write comments in PHP program
- Perform mathematical expressions using PHP programs
- Describe various operators and precedence of PHP operations
- Produce output statements with variables
- Use of escape sequences
- Evaluate the outputs of given PHP expressions

Lesson Outline:

- Comments in PHP
- Mathematical operators in PHP
- Operator precedence
- Combination of output text with variables
- Built-in mathematical functions of PHP

Assignment:

Create PHP program to solve a given expression when input variables are given.

Other Activities:

Extra References:

https://www.w3schools.com/php/php_variables.asp

https://www.tutorialspoint.com/php/php_variable_types.htm

Week 05: Lesson 5 - PHP built-in functions and classes

Introduction:

During this week students will learn to write PHP programs with PHP built-in functions and control structures. Further the students will learn on structuring server side scripts with program iterations and classes.

Learning Outcomes for Week 05:

After completion of this lesson, the learner will be able to create php scripts with control structures, loops and built-in functions on a given guideline.

- Write PHP functions with parameters
- Describe the common built-in functions
- Apply PHP built-in classes
- Apply control structures in PHP
- Apply arrays and string operations

Lesson Outline:

- PHP functions
    - Function calls
    - Parameters
- Built-in functions
    - Date, data type conversions, mathematical functions
- Control structures in PHP
    - IF … Else, ternary operator
    - Switch … case
- Iterative structures
    - for , while, do .. while, foreach loops
- PHP classes and built-in classes
- Arrays and associated operations
- Strings and associated operations

Assignment:

Write a php program to store your personal data in an object and calculate age using built-in functions.

Other Activities:

Extra References:

https://www.w3schools.com/php/php_if_else.asp
https://www.w3schools.com/php/php_looping.asp
http://php.net/manual/en/language.oop5.basic.php
https://www.w3schools.com/php/php_functions.asp

Week 06: Lesson 6 - Form data processing and Input/output operations

Introduction:

During this week students will create web forms with server script processing. Here the web data input forms will be created with interactive data feeding and processing in the back-end. Further, the necessary methods for data sending, processing also be discussed.

Learning Outcomes for Week 06:

After completion of this lesson, the learner will be able to create web forms with back-end processing scripts where data input and output operations are performed through client server communication.

- Use form element with its attributes
- Use form method attribute appropriately
- Obtain data sent by a web form in back-end php script
- Process clients' form data using php script and return output
- Perform input-output operations with form data

Lesson Outline:

- Form tag and its attributes
    - GET and POST methods
    - $_GET and $_POST
- Form elements and associated identities
- Access form data array
- Input and output operations in php
- Form data type conversions in php
- Input data validation
- Working with regular expressions

Assignment:

Create a bill calculation form by using php server script for a grocery.

Other Activities:

Extra References:

https://www.w3schools.com/php/php_forms.asp

Week 07: Lesson 7 - I/O file handling and cookies

Introduction:

During this week student will learn on working with external input and output files by using php. The learner will be able to create, write, append, update and maintain external data files. Further, php cookies will be discussed as an usability enhancing technology in web application operations.

Learning Outcomes for Week 07:

After completion of this lesson, the learner will be able to manage application data with external files by using php.

- Create external files using php
- Open and manipulate input and output data files
- Process data within input and output files
- Upload files
- Write php applications to create cookies
- Create php applications to utilize cookies

Lesson Outline:

- Input and output file operations
- Open external files
    - File opening modes
- Load data from external files
- Writing into external files
- Process data in external files
- Cookies and its usage
- Applications of cookies

Assignment:

Create a web application to generate another php script to check input name and passcode given from the first application as an input (both should be form applications).

Other Activities:

Extra References:

https://www.w3schools.com/php/php_file.asp

Week 08: Lesson 08- Processing and Regular Expressions

Introduction:

During this week student will learn process string data with the help of regular expressions. The learners will be able to apply regular expressions to perform pattern matching within the string data. The learner will be able to learn string comparison functions.

Learning Outcomes for Week 08:

After completion of this lesson, the learner will be able to write PHP functions to perform string processing with the help of regular expressions

- Describe string data indexes
- Apply pattern matching functions
- Write regular expressions
- Match regular expressions with strings
- Find and replace string data

Lesson Outline:

- String data representation
- Indexes of string data
- Patterns within string data
- Regular expressions
- String pattern matching functions
- Matching regular expressions
- Find and replace data
- Extraction of data

Assignment:

Create a PHP website to take any given text file as input and search for words matching with the given regular expression and list down the resultant word set.

Other Activities:

Extra References: https://www.tutorialspoint.com/php/php_regular_expression.htm
https://www.tutorialspoint.com/php/php_strings.htm

Week 09: Lesson 09- Business Logic Operations and Database Connectivity

Introduction:

During this week student will learn use of data tier of a business application. Here the learner will be able create database connection to MySQL database to perform database operations. The learner will be able to separate the business logic from the data logic.

Learning Outcomes for Week 09:

After completion of this lesson, the learner will be able to create database connections from PHP and access MySQL databases

- Describe the application logic and data logic
- Create database connection from PHP to MySQL
- Access databases through PHP functions
- Test Database operations

Lesson Outline:

- Data tier
- Application logic and data logic
- Database connections
  - Access parameters
  - Status
- Testing of database connections
- Functions to access databases
- Create database from PHP

Self Assessment:

Write a PHP program to connect to a database and create a database with employee table.

Other Activities:

Extra References: https://www.w3schools.com/php/php_mysql_intro.asp

Week 10: Lesson 10 - Database Manipulation and Operations with SQL

Introduction:

During this week student will learn about perform database operations though SQL statements. The learner will be able to apply SQL statements to perform business transactions using PHP. Further, the learner will learn about PHP library functions on MySQL database operations. The students will get an opportunity to apply the knowledge acquired in database management systems module in this lesson to do online transactions.

Learning Outcomes for Week 09:
After completion of this lesson, the learner will be able to write and execute SQL operations using PHP to manipulate MySQL Databases.

- Write SQL statements
- Execute and test SQL statements on MySQL database
- Obtain result sets through filtering of data
- Filter and display Queried data

Lesson Outline:

- Database Queries
- SQL statements
- MySQL Database Operations through PHP
- Input and output of Database Query Execution
- Data Filtering operations
- Test MySQL operations through PHP

Assignment:

Create a web page to retrieve personal details of an employee when his first name or last name is given as an input using a web page. (Assume that Employee table is available inside a database)

Other Activities:

Extra References: https://www.w3schools.com/php/php_mysql_insert.asp

Week 11: Lesson 11- Session Handling and External Function Calls

Introduction:

During this week learner will learn how to maintain data and variable throughout an application session. Further, the learner will be able to create applications with session variables and external functional calls. The built-in library functions used in PHP for session handling and external program calls will be discussed in this lesson.

Learning Outcomes for Week 11:

After completion of this lesson, the learner will be able to create web applications with session variables and external scripts.

- Create web application with external PHP functions
- Redirect web connection
- Share consistent PHP functions among web application system
- Create sessions with session variables and parameters
- Call session variables and apply session variables throughout a web application

Lesson Outline:

- External programs and functions
- PHP include and require statements
- Sharing common functions
- PHP sessions
    - o Create sessions
    - o Session IDs
    - o Session variables
    - o Session variable parameters
- Apply session variables

Assignment:

Create Web application with multiple pages to maintain the inputs provided at the beginning remains until the last page of navigation.

Other Activities:

Extra References: https://www.w3schools.com/php/php_sessions.asp

Week 12: Lesson12- Ritch Internet Applications with AJAX

Introduction:

During this week learner will learn about asynchronous web communication with server. The learner will be able to apply AJAX scripts to build RIA (Ritch Internet Applications). Further, learner will be able understand the states of web communications.

Learning Outcomes for Week 12:

After completion of this lesson, the learner will be able create web applications with AJAX scripts.

- Describe Asynchronous web communication
- Create AJAX application to load data from the server
- Update web interface by using AJAX
- Apply AJAX with DOM to retrieve data

Lesson Outline:

- Asynchronous web communications
  - Web application examples
- Stages and status of web communication
- RIA concept
- AJAX script operation
- Calling data files from sever through AJAX
- Retrieve data using AJAX with the help of DOM
- Parse data to the server and obtain outputs

Assignment:

Create an application to load a data from XML file hosted at the sever and list the data according to a selected field given in a dropdown box.

Other Activities:

Extra Reference: https://www.w3schools.com/php/php_ajax_intro.asp

Week 13: Lesson 13- AJAX with PHP

Introduction:

During this week learner will learn the concept of API calls done through AJAX. Here, the learner will create API's using PHP and web interface with AJAX is used to call the API's. This nature of interactions has added an extra dimension to the web system where user can experience can obtain spontaneous feedback generated from the server.

Learning Outcomes for Week 13:

After completion of this lesson, the learner will be able to create AJAX applications to interact with PHP server scripts to enable RIA.

- Describe the concept of web API
- Create AJAX applications to call PHP programs
- Perform input/output operations with PHP programs through AJAX
- Build RIA using PHP API's and AJAX

Lesson Outline:

- Application Programing Interfaces (API)
- Input/output operations with PHP programs
- Calling PHP program and obtain output by using AJAX
- Create API using PHP
- AJAX and PHP I/O operations
- Three tier operations with AJAX scripts

Assignment:

Modify the application created in lesson 10 by using AJAX and API concepts.

Other Activities:

Additional Reading: https://www.w3schools.com/php/php_ajax_php.asp

Week 14: Lesson 14- Use MVC frameworks for Web Programing

Introduction:

During this week learner will learn the MVC frameworks to build Ritch Internet Applications. Modern businesses industries require quick and easy development environments for their application developments. Hence, Web scripting frameworks are capable of providing user-friendly customizable environments for web developers with most powerful sever-side functionalities together with RIA tools.

Learning Outcomes for Week 14:
After completion of this lesson, the learner will be able to create websites using industry oriented MVC framework.

- Describe the use of MVC framework for web application development
- Differentiate various PHP frameworks and their applications
- Install and deploy a PHP framework
- Apply a PHP framework tools and libraries to build industry ready web applications

Lesson Outline:

- MVC frameworks for Web application development
    - Working with web architecture
    - Working with tiers
    - Libraries
- PHP scripting frameworks
- Laravel framework
    - Installation
    - Server configuration
- Laravel Architecture concepts
- Laravel Basics
- Create web application with Laravel framework
- Host web application created by Laravel framework

Assignment:
Creation of a web system for a given scenario using suitable Laravel framework

Other Activities:
Reading: https://laravel.com