

Server side web development

420-DCS-ID

Learning Guide

Course Title: Server side web development

Course Description

This course will explore the fundamentals of Web development and programming with PHP and MySQL. This course will explore four key areas of PHP and MySQL; the programming constructs with PHP, accessing and manipulating data through the use of forms, object oriented programming with PHP and Web site security with PHP. Students will learn to work with PHP data types and operators, build functions and control structures, manipulate strings, access files and directories, process data in arrays and strings, work with MySQL databases and manipulate MySQL databases with PHP. Students will also learn how to manage state information, develop object-oriented PHP, handle errors and exceptions and debug PHP code.

Course Objectives:

Upon successful completion of this course, students will be able to:

- Appreciate the versatility of PHP as a programming language.
- Embed PHP code in HTML to implement dynamic functionality to Web pages.
- Work with PHP functions, data type and operators.
- Implement program flow control structures of sequence, decisions and iteration with PHP.
- Implement forms and validate their content.
- Implement various types of data storage functionality with PHP.
- Manipulate data in strings and arrays.
- Design a MySQL database using the concepts of relational database modelling.
- Use the features of PHP and MySQL to insert, retrieve, query update and display content of a MySQL database.
- Access a MySQL database from the web with PHP.
- Backup, restore and replicate MySQL databases.
- Identify the common security threats that web applications face and ways to mitigate them.
- Explain strategies for building a secure Web application and securing PHP code.
- Implement authentication methods with PHP.
- Create PHP code that interacts with the file system and server.
- Implement network and protocol functions in PHP.
- Implement internationalization and localization strategies in a PHP site.
- Implement session control and functionality.
- Use PHP and MySQL to build large web application projects.
- Debug PHP code.
- Implement PHP error and exception handling features.
- Implement user authentication and personalization.

Course Resources:

PHP and MySQL Web Development, 5th edition, Luke Welling, Laura Thomson, ISBN-13: 9780321833891, Pearson Education

Hardware

- One computer per student

Software

- A Windows operating system (Windows 10) installed on the computer
- Text editing software.
- MYSQL Software.
- Server.
- Several Internet Browsers (Chrome, FireFox, Edge) to test your web pages.

Practical exercises and activities

This course comes with a large number of practical exercises and activities embedded within each lesson or chapter. Each step by step activity will guide you through a set of prescribed step by step exercises that are aimed at reinforcing content that was covered in the lesson. Please note that although the source code for the practical exercises is available for download from the book's companion web site, it is critical that you code the solutions yourself where applicable. You can use the solution to verify your work, but if you want to be successful in mastering the PHP syntax and programming skills, you should enter the code yourself.

Review exercises (Progress Checks)

Each chapter comes with an end of chapter progress check. To check your progress, you will be required to complete the questions at the end of the module. The Progress checks are available in the work files given to you by your instructor.

Module 1: Introduction to PHP

- Overview of PHP
- Embedding PHP in HTML
- Adding dynamic content
- Accessing form variables
- Working with identifiers
- Working with files
 - Creating files
 - Opening files
 - Reading and writing to files
 - Closing files
 - Locking deleting and other files functions

Important:

You will need a server environment to be able to run the exercises. If you are using one of the college's computer, the server setup is probably already installed, go see your instructor to know how to use it. If you want to install the server on your own computer, the book recommends installing Apache, PHP and MySQL individually, but there is a much simpler way. We recommend first installing MySQL Workbench (the free community edition). This will install the MySQL server and the Workbench graphical user interface. Then, download and install XAMPP (also free). XAMPP will install Apache and PHP for you. While installing XAMPP, make sure to select the manual installation and DO NOT install MySQL as it is already installed.

Reading and Practical Activities:

➤ Chapters 1 & 2: Introduction to PHP Pg. 11 to 74

<input type="checkbox"/> Overview of PHP	Pages: 11 to 14
<input type="checkbox"/> Embedding PHP in HTML	Pages: 14 to 18
<input type="checkbox"/> Adding dynamic content	Pages: 18 to 20
<input type="checkbox"/> Accessing form variables	Pages: 20 to 23
<input type="checkbox"/> Working with identifiers	Pages: 23 to 51
<input type="checkbox"/> Working with files	Pages: 53 to 73

➤ Progress Check

<input type="checkbox"/> Exercise 1	Refer to Pages 11 to 74
-------------------------------------	-------------------------

Module 2: Arrays, Strings and Functions

- Numerically and non-numerically indexed arrays
- Array operators
- Multidimensional arrays
- Array sorting
- Array functions
- Formatting Strings
- Joining and Splitting Strings
- Comparing Strings

Reading and Practical Activities:

➤ Chapters 3 & 4: Arrays, Strings and Functions Pg. 75 to 116

<input type="checkbox"/> Numerically and non-numerically indexed arrays	Pages: 75 to 81
<input type="checkbox"/> Array operators	Pages: 81 to 82
<input type="checkbox"/> Multidimensional arrays	Pages: 82 to 85
<input type="checkbox"/> Array sorting	Pages: 85 to 92
<input type="checkbox"/> Array functions	Pages: 92 to 100
<input type="checkbox"/> Formatting strings	Pages: 101 to 112
<input type="checkbox"/> Joining and splitting strings	Pages: 112 to 114
<input type="checkbox"/> Comparing strings	Pages: 114 to 116

➤ Progress Check

<input type="checkbox"/> Exercise 2	Refer to Pages 75 to 116
-------------------------------------	--------------------------

Module 3: Arrays, Strings and Functions(Continued)

- Matching and replacing substrings
- Using regular expressions
- Re-using code and its advantages
- Defining functions
- Function parameters, scope and return values.
- Calling by value and calling by reference
- Implementing recursion in PHP

Reading and Practical Activities:

➤ Chapters 4 & 5: Arrays, Strings and Functions Pg. 116 to 158

<input type="checkbox"/> Matching and replacing substrings	Pages: 116 to 119
<input type="checkbox"/> Using regular expressions	Pages: 119 to 130
<input type="checkbox"/> Re-using code and its advantages	Pages: 131 to 140
<input type="checkbox"/> Defining functions	Pages: 140 to 146
<input type="checkbox"/> Function parameters, scope and return values	Pages: 146 to 148
<input type="checkbox"/> Calling by value and calling by reference	Pages: 148 to 153
<input type="checkbox"/> Implementing recursion in PHP	Pages: 153 to 156

➤ Progress Check

<input type="checkbox"/> Exercise 3	Refer to Pages 101 to 156
-------------------------------------	---------------------------

Module 4: Object Oriented PHP and Error Handling

- Review of OOP concepts and how it applies to PHP
- Classes, attributes, operations and constants
- Invoking class methods
- Inheritance and access modifiers
- Static methods
- Object cloning and abstract classes
- Exception handling concepts
- Exception handling control structures (try...throw... catch)
- Other PHP error handling mechanisms

Reading and Practical Activities:

➤ **Chapters 6 & 7: Object Oriented PHP and Error Handling Pg. 159 to 208**

<input type="checkbox"/> Review of OOP concepts and how it applies to PHP	Pages: 159 to 162
<input type="checkbox"/> Classes, attributes, operations and constants	Pages: 162 to 165
<input type="checkbox"/> Invoking class methods.	Pages: 165 to 168
<input type="checkbox"/> Inheritance and access modifiers	Pages: 168 to 177
<input type="checkbox"/> Static methods	Pages: 177 to 184
<input type="checkbox"/> Object cloning and abstract classes	Pages: 184 to 198
<input type="checkbox"/> Exception handling concepts	Pages: 198 to 201
<input type="checkbox"/> Exception handling control structures	Pages: 201 to 208
<input type="checkbox"/> Other PHP error handling mechanisms	Page: 208

➤ **Progress Check**

<input type="checkbox"/> Exercise 4	Refer to Pages 159 to 208
-------------------------------------	---------------------------

It's now time for your midterm exam. You have to be comfortable with form handling and writing to files. Go see your instructor.

Module 5: MYSQL Databases

- Relational Database concepts and Terminology (Review)
- Designing a Web database
- Web database architecture
- Creating a MySQL database
- Setting up users and privileges
- Creating database tables and indexes
- Column types in MySQL
- Inserting data into the database
- Retrieving data from the database
- Joining tables
- Using Subqueries
- Updating records from the database
- Altering and dropping tables
- Deleting Records from the database

Note: You can use MySQL Workbench to more easily interact with the MySQL server. You will see that it feels the same as using SQL Management Studio for SQL Server.

Reading and Practical Activities:

➤ Chapters 8, 9 & 10: MYSQL Databases Pg. 209 to 271

<input type="checkbox"/> Relational database concepts and terminology	Pages: 209 to 213
<input type="checkbox"/> Designing a web database	Pages: 213 to 218
<input type="checkbox"/> Web database architecture	Pages: 218 to 220
<input type="checkbox"/> Creating a MYSQL database	Pages: 222 to 224
<input type="checkbox"/> Setting up users and privileges	Pages: 224 to 232
<input type="checkbox"/> Creating database tables and indexes	Pages: 232 to 240
<input type="checkbox"/> Column types in MYSQL	Pages: 240 to 246
<input type="checkbox"/> Inserting data into the database	Pages: 247 to 250
<input type="checkbox"/> Retrieving data from the database	Pages: 250 to 264
<input type="checkbox"/> Joining tables	Pages: 250 to 264
<input type="checkbox"/> Using subqueries	Pages: 250 to 264
<input type="checkbox"/> Updating records from the database	Pages: 264 to 265
<input type="checkbox"/> Altering and dropping tables	Pages: 265 to 268
<input type="checkbox"/> Deleting records from the database	Pages: 268 to 269

➤ Progress Check

<input type="checkbox"/> Exercise 5	Refer to Pages 209 to 271
-------------------------------------	---------------------------

Module 6: Accessing Content in MYSQL Databases

- Querying a MySQL database
- Setting up a connection to a MySQL database
- Retrieving the query results
- Disconnecting from the database
- Using prepared statements
- Using PHP and other database interfaces.
- The MySQL privilege system
- Using indexes to increase speed
- Optimizing databases
- Backing up and replicating databases
- The LOAD DATA INFILE statement and why it is used
- Storage engines
- Transactions and stored procedures

NOTE: Items in (*ITALIC*) are not mandatory reading.

Reading and Practical Activities:

➤ Chapters 11, 12 & 13: Accessing Content in MYSQL Databases Pg. 271 to 330

<input type="checkbox"/> Querying a MYSQL database	Pages: 271 to 281
<input type="checkbox"/> Setting up a connection to a MYSQL database	Pages: 276 to 280
<input type="checkbox"/> Retrieving the query results	Pages: 280 to 281
<input type="checkbox"/> Disconnecting from the database	Pages: 281 to 285
<input type="checkbox"/> Using prepared statements	Pages: 285 to 289
<input type="checkbox"/> Using PHP and other database interfaces	Pages: 285 to 289
<input type="checkbox"/> The MYSQL privilege system	Pages: 291 to 301
<input type="checkbox"/> Using indexes to increase speed	Pages: 301 to 309
<input type="checkbox"/> Optimizing databases	Pages: 309 to 310
<input type="checkbox"/> Backing up and restoring databases	Pages: 310 to 310
<input type="checkbox"/> (<i>Replication, The LOAD DATA INFILE statement and why it is used</i>)	<i>Pages: 311 to 315</i>
<input type="checkbox"/> (<i>Storage engines</i>)	<i>Pages: 315 to 317</i>
<input type="checkbox"/> Transactions and stored procedures	Pages: 317 to 329

➤ Progress Check

<input type="checkbox"/> Exercise 6	Refer to Pages 271 to 330
-------------------------------------	---------------------------

Module 7: Security and Authentication

- Common threats that web applications face
- Strategies for dealing with security
- Securing all the components of a Web application
 - the code
 - the web server
 - PHP
 - Database server
- Identifying visitors and implementing access control
- Using basic authentication in PHP
- Overview of Apache's .htaccess basic authentication

Reading and Practical Activities:

➤ Chapters 14, 15 & 16: Security and Authentication pg. 331 to 379

<input type="checkbox"/> Common threats that web applications face	Pages: 331 to 339
<input type="checkbox"/> Strategies for dealing with security	Pages: 341 to 343
<input type="checkbox"/> Securing all the components of a web application	Pages: 343 to 364
<input type="checkbox"/> Identifying visitors and implementing access control	Pages: 365 to 372
<input type="checkbox"/> Using basic authentication in PHP	Pages: 372 to 373
<input type="checkbox"/> Overview of Apache's .htaccess basic authentication	Pages: 373 to 377

➤ Progress Check

<input type="checkbox"/> Exercise 7	Refer to Pages 331 to 379
-------------------------------------	---------------------------

Module 8: Working with the file system, network and protocols

- Uploading files with PHP
- Using Directory Functions
- Interacting with files on the server
- Executing programs on the server.
- Working with Network protocols
- Sending and receiving emails
- Using data from websites
- Working with FTP

NOTE: Items in (*ITALIC*) are not mandatory reading. Also, the ***Sending and receiving emails*** section will not work without a valid SMTP provider.

Reading and Practical Activities:

➤ **Chapters 17 & 18: Working with the File System, Network and Protocols Pg. 379 to 422**

<input type="checkbox"/> Uploading files with PHP	Pages: 379 to 389
<input type="checkbox"/> Using Directory functions	Pages: 389 to 394
<input type="checkbox"/> Interacting with files on the server	Pages: 394 to 398
<input type="checkbox"/> (<i>Executing programs on the server</i>)	<i>Pages: 398 to 402</i>
<input type="checkbox"/> (<i>Working with network protocols</i>)	<i>Pages: 403 to 404</i>
<input type="checkbox"/> (<i>Sending and receiving emails</i>)	<i>Pages: 404 to 404</i>
<input type="checkbox"/> (<i>Using data from websites</i>)	<i>Pages: 404 to 412</i>
<input type="checkbox"/> (<i>Working with FTP</i>)	<i>Pages: 412 to 421</i>

➤ **Progress Check**

<input type="checkbox"/> Exercise 8	Refer to Pages 379 to 422
-------------------------------------	---------------------------

Module 9: Advanced features – Date/Time/Internationalization and images.

- Getting the date and time in PHP
- Converting between PHP and MySQL data formats
- Using the calendar functions
- Working with different character sets
- Structuring an application to produce localized content
- Ensuring internationalization and localization of content.
- Setting up image support in PHP
- Understanding image formats
- Creating images and generating images
- Using Texts and fonts to create images

NOTE: Items in (*ITALIC*) are not mandatory reading.

Reading and Practical Activities:

➤ Chapters 19, 20 & 21: Advanced Features – Date/Time/Internationalization and Images

Pg. 423 to 474

<input type="checkbox"/> Getting the date and time in PHP	Pages: 361 to 372
<input type="checkbox"/> Converting between PHP and MYSQL data formats	Pages: 373 to 376
<input type="checkbox"/> Using calendar functions	Pages: 376 to 379
<input type="checkbox"/> Working with different character sets	Pages: 379 to 380
<input type="checkbox"/> Structuring an application to produce localized content	Pages: 380 to 382
<input type="checkbox"/> Ensuring internationalization and localization of content.	Pages: 383 to 385
<input type="checkbox"/> (<i>Setting up image support in PHP</i>)	<i>Pages: 385 to 395</i>
<input type="checkbox"/> (<i>Understanding image formats</i>)	<i>Pages: 395</i>
<input type="checkbox"/> (<i>Creating images and generating images</i>)	<i>Pages: 395 to 398</i>
<input type="checkbox"/> (<i>Using texts and fonts to create images</i>)	<i>Pages: 250 to 264</i>

➤ Progress Check

<input type="checkbox"/> Exercise 9	Refer to Pages 423 to 474
-------------------------------------	---------------------------

Module 10: Real World Web Applications

- Understanding Session control
- Using Cookies
- Steps in setting up a session
- Session variables
- Session authentication
- Planning and running a web application project
- Implementing version control
- Development environments

Reading and Practical Activities:

➤ Chapters 22 & 25: Real World Web Applications Pg. 475 to 492 & 529 to 542

<input type="checkbox"/> Understanding session control	Pages: 475 to 477
<input type="checkbox"/> Using cookies	Pages: 477 to 478
<input type="checkbox"/> Steps in setting up a session	Pages: 478 to 479
<input type="checkbox"/> Session variables	Pages: 479 to 482
<input type="checkbox"/> Session authentication	Pages: 482 to 491
<input type="checkbox"/> Planning and running a web application project	Pages: 530 to 536
<input type="checkbox"/> Implementing version control	Pages: 536 to 537
<input type="checkbox"/> Development environment	Pages: 537 to 540
<input type="checkbox"/> Styling the tabbed user interface	Pages: 540 to 542

➤ Progress Check

<input type="checkbox"/> Exercise 10	Refer to Pages 475 to 492
--------------------------------------	---------------------------

Session 11: Authentication and Personalization

- Programming, syntax, runtime and logic errors
- Error messages
- Triggering and handling errors
- Logging in and authenticating users
- Managing passwords
- Recording user preferences
- Personalizing content
- Recommending content based on user preferences

NOTE: Items in (*ITALIC*) are not mandatory reading.

Reading and Practical Activities:

➤ **Chapters 26 & 27: Authentication and Personalization Pg. 543 to 597**

<input type="checkbox"/> Programming, syntax, runtime and logic errors	Pages: 543 to 553
<input type="checkbox"/> (<i>Error messages</i>)	<i>Pages: 553 to 556</i>
<input type="checkbox"/> (<i>Triggering and handling errors</i>)	<i>Pages: 556 to 556</i>
<input type="checkbox"/> (<i>Logging in and authenticating users</i>)	<i>Pages: 556 to 560</i>
<input type="checkbox"/> Managing passwords	Pages: 561 to 587
<input type="checkbox"/> Recording user preferences	Pages: 587 to 590
<input type="checkbox"/> Personalizing content	Pages: 590 to 594
<input type="checkbox"/> Recommending content based on user preferences	Pages: 594 to 597

There is no progress check for this module.

You are now ready for the final exam and project, go see your instructor.