

# **CS250T**

## **Open Source Application Programming**

### **[Onsite]**

**Course Description:**

This course covers how to implement open source server-side Web applications by analyzing the LAMP development model: Linux, Apache, MySQL, and PHP.

**Prerequisite(s) and/or Corequisite(s):**

Prerequisites: CS111T Client-Side Web Scripting Development or equivalent, IT203T Database Development or equivalent, IT218T Programming in Java I or equivalent

**Credit hours: 4**

**Contact hours: 60 (36 Theory Hours, 24 Lab Hours)**

# Syllabus: Open Source Application Programming

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Instructor: _____
Office hours: _____
Class hours: _____

## Major Instructional Areas

1. Different platforms for creating open source Web applications
2. Fundamental tasks required to configure a computer running Linux as a development platform
3. Basic Apache Web server configuration techniques
4. Database creation using MySQL
5. Introduction to Web application development using PHP
6. Introduction to Web application development using the Ruby on Rails framework

## Course Objectives

1. Describe the use and licensing of open source software.
2. Use the Linux operating system.
3. Configure Apache Web server to host a Web site.
4. Create a Web application that accesses a MySQL database.
5. Create a Web application using PHP.
6. Create a Web application using Ruby on Rails.

## SCANS Objectives

SCANS is an acronym for Secretary's Commission on Achieving Necessary Skills. The committee, created by the National Secretary of Labor in the early 1990s, created a list of skills and competencies that the committee feels are necessary for employees to function in a high-tech job market.

1. Acquire and evaluate information
2. Use computers to process information
3. Apply and adapt new knowledge and skills in both familiar and changing situations.
4. Demonstrate the ability to effectively and efficiently utilize the ITT Tech Virtual Library.
5. Select and analyze information and communicate the results.
6. Determine which set of procedures will produce the desired results and make clear recommendations including rationale.
7. Analyze system and develop new or alternative systems
8. Demonstrate the ability to make a rational decision based on analysis of accepted theories, evidence and logical thinking.

## Course Outline

Note: All graded activities, except the project and exams, are listed below in the pattern of <Unit Number>.<Assignment Number>. For example, Labs: 3.1 refers to the 1<sup>st</sup> lab activity in Unit 3.

Unit	Activities
1– Open Source and Linux	<ul style="list-style-type: none"> <li>• Content Covered: <i>Open Source Application Programming</i>:               <ul style="list-style-type: none"> <li>○ Chapter 1, “Welcome to Linux”</li> <li>○ Chapter 2, “Introduction to Fedora and Red Hat Enterprise Linux”</li> </ul> </li> <li>• Assignments: 1.1</li> <li>• Labs: 1.1</li> </ul>
2– Linux and Apache	<ul style="list-style-type: none"> <li>• Read from: <i>Open Source Application Programming</i>:               <ul style="list-style-type: none"> <li>○ Chapter 3, “Apache (httpd): Setting Up a Web Server”</li> </ul> </li> </ul> <p><i>Linux for Programmers and Users:</i></p>

Unit	Activities
	<ul style="list-style-type: none"> <li>○ Chapter 4, “GNU Utilities for Non-Programmers”</li> <li>● Assignments: 2.1</li> <li>● Labs: 2.1</li> </ul>
3– PHP	<ul style="list-style-type: none"> <li>● Read from <i>Open Source Application Programming</i>: <ul style="list-style-type: none"> <li>○ Chapter 5, “PHP Crash Course”</li> <li>○ Chapter 6, “Using Arrays”</li> </ul> </li> <li>● Assignments: 3.1</li> <li>● Labs: 3.1</li> <li>● Quizzes: 3.1</li> </ul>
4– PHP Functions and Objects	<ul style="list-style-type: none"> <li>● Read from <i>Open Source Application Programming</i>: <ul style="list-style-type: none"> <li>○ Chapter 7, “String Manipulation and Regular Expressions”</li> <li>○ Chapter 8, “Reusing Code and Writing Functions”</li> <li>○ Chapter 9, “Object-Oriented PHP”</li> </ul> </li> <li>● Assignments: 4.1</li> <li>● Labs: 4.1</li> <li>● Project 1 Part 1 due</li> </ul>
5– MySQL Database Access	<ul style="list-style-type: none"> <li>● Read from <i>Open Source Application Programming</i>: <ul style="list-style-type: none"> <li>○ Chapter 11, “Creating Your Web Database”</li> <li>○ Chapter 12, “Accessing Your MySQL Database from the Web with PHP”</li> </ul> </li> <li>● Assignments: 5.1</li> <li>● Labs: 5.1</li> <li>● Project 1 Part 2 due</li> </ul>
6– Creating an	<ul style="list-style-type: none"> <li>● Read from <i>Open Source Application Programming</i>:</li> </ul>

Unit	Activities
Application Using PHP	<ul style="list-style-type: none"> <li>○ Chapter 10, "Error and Exception Handling"</li> <li>○ Chapter 13, "Using Session Control in PHP"</li> <li>○ Chapter 14, "Building User Authentication and Personalization"</li> </ul> <ul style="list-style-type: none"> <li>● Assignments: 6.1</li> <li>● Labs: 6.1</li> <li>● Project 1 Part 3 due</li> <li>● Quizzes: 6.1</li> </ul>
7– Introduction to Ruby on Rails	<ul style="list-style-type: none"> <li>● Read from <i>Open Source Application Programming</i>: <ul style="list-style-type: none"> <li>○ Chapter 15, "Introduction"</li> <li>○ Chapter 16, "Getting started"</li> </ul> </li> <li>● Assignments: 7.1</li> <li>● Labs: 7.1</li> <li>● Project 1 Part 4 due</li> <li>● Exam I</li> </ul>
8– Implementing User Registration with Ruby on Rails	<ul style="list-style-type: none"> <li>● Read from <i>Open Source Application Programming</i>: <ul style="list-style-type: none"> <li>○ Chapter 17, "Modeling users"</li> <li>○ Chapter 18, "Registering users"</li> <li>○ Chapter 19, "Getting started with testing"</li> </ul> </li> <li>● Assignments: 8.1</li> <li>● Labs: 8.1</li> <li>● Project 2 Part 1 due</li> </ul>
9– Implementing Sessions and Login with Ruby on Rails	<ul style="list-style-type: none"> <li>● Read from <i>Open Source Application Programming</i>: <ul style="list-style-type: none"> <li>○ Chapter 20, "Logging in and out"</li> <li>○ Chapter 21, "Advanced login"</li> </ul> </li> </ul>

Unit	Activities
	<ul style="list-style-type: none"><li>• Assignments: 9.1</li><li>• Labs: 9.1</li><li>• Project 2 Part 2 due</li></ul>
10– Implementing Updates and Profiles with Ruby on Rails	<ul style="list-style-type: none"><li>• Read from <i>Open Source Application Programming</i>:<ul style="list-style-type: none"><li>○ Chapter 22, “Updating User Information”</li><li>○ Chapter 23, “Personal Profiles”</li></ul></li><li>• Assignments: 10.1</li><li>• Labs: 10.1</li><li>• Project 2 Part 3 due</li><li>• Quizzes: 10.1</li></ul>
11– Review and Exam II	<ul style="list-style-type: none"><li>• Exam II</li><li>• Project 2 Part 4 due</li></ul>

## Instructional Methods

This course is designed as an introduction to Linux and different platforms for creating open source Web applications. The first two units of the course will focus on how to use Linux, with an emphasis on the tasks you will need to perform as a developer of a Web application that runs on the Linux platform. You will also learn some basic techniques for configuring Apache Web server.

After you are familiar with the open source environment, you will learn the syntax of PHP, a server-side scripting language frequently used to develop LAMP (Linux Apache MySQL PHP) applications. Because you are already familiar with several different programming languages, the syntax for using PHP will be covered quickly. You will also learn how to create a database using MySQL and access that database through a PHP application. Like SQL Server, MySQL is a relational database that allows you to perform Structured Query Language (SQL) operations. We will conclude the PHP coverage by examining a simple application that provides user authentication and personalization.

During the remainder of the course, you will learn to use Ruby on Rails, a framework used in many Web development environments. You will learn the benefits of using a framework like Ruby on Rails and the fundamentals of the Ruby scripting language. You will use Ruby on Rails to create an application that provides user authentication and personalization.

Hands-on practice is essential to learning any programming language. During this course, you will complete labs that allow you to execute Linux commands and create Web applications using the techniques covered in the text. You will also be given written assignments to evaluate your knowledge of the concepts and techniques covered in the course. You will also complete a project in which you will build a Web application that uses PHP and Ruby on Rails.

## Instructional Materials and References

### Student Textbook Package

- Sobell, Mark, Graham Glass, King Ables, Michael Hartl, Aurelius Prochazka, Luke Welling, and Laura Thomson. *Open Source Application Programming*. Indianapolis: Pearson Custom Publishing, 2010.

### Other Required Resources

In addition to the student textbook package, the following is also required in this course:

- Internet access

### Equipment and Tools

- Fedora 12 Linux virtual machine configured to run Apache, PHP, and Ruby on Rails

- VMware Player 3.0

## References

### ITT Tech Virtual Library

Log on to the ITT Tech Virtual Library at <http://library.itt-tech.edu/> to access online books, journals, and other reference resources selected to support ITT Tech curricula.

#### Books

You may click “Books” or use the Library Catalog on the home page to find the following books.

- Books 24x7
  - Alameda, Eldon. *Foundation Rails 2. New York: Friends of Ed, 2008.*
  - Bakharia, Aneesh. *Ruby on Rails Power!: The Comprehensive Guide.* Boston: Cengage Course Technology, 2007.
  - Benson, Edward. *The Art of Rails. Hoboken, NJ: Wrox Press, 2008.*
  - Boronczyk, Timothy, et al. *Beginning PHP6, Apache, MySQL Web Development.* Hoboken, NJ: Wrox Press, 2009.
  - Burd, Barry. *Ruby on Rails for Dummies. Indianapolis: John Wiley & Sons, 2007.*
  - Cangiano, Antonio. *Ruby on Rails for Microsoft Developers. Hoboken, NJ: Wrox Press, 2009.*
  - Cooper, Peter. *Beginning Ruby: From Novice to Professional. 2<sup>nd</sup> ed.* New York: Apress, 2009.
  - Danesh, Arman. *Mastering Linux.* Alameda, CA: Sybex, 1999.
  - Diaz, Christopher. *Introduction to UNIX/Linux. Hingham, MA: Cengage Charles River Media, 2007.*
  - Dulaney, Emmett, and Naba Barkakati. *Linux All-in-One Desk Reference for Dummies. 3<sup>rd</sup> ed.* Indianapolis: John Wiley & Sons, 2008.



- Easttom, Chuck, and Bryan Hoff. *Moving from Windows to Linux. 2<sup>nd</sup> ed.* Hingham, MA: Cengage Charles River Media, 2004.
- Fisher, Timothy. *Ruby on Rails Bible. Indianapolis: John Wiley & Sons, 2008.*
- Gabarró, Steven A. *Web Application Design and Implementation: Apache 2, PHP5, MySQL, JavaScript, and Linux/UNIX. Washington, DC: IEEE Computer Society Press, 2007.*
- Gilmore, W. Jason. *Beginning PHP and MySQL: From Novice to Professional. 3<sup>rd</sup> ed. New York: Apress, 2008.*
- Hardy, Jeffrey Allan, Cloves Carneiro Jr., and Hampton Catlin. *Beginning Rails: From Novice to Professional. New York: Apress, 2007.*
- Harris, Andrew B. *PHP 6/MySQL Programming for the Absolute Beginner. Boston: Cengage Course Technology, 2009.*
- Hellsten, Christian, and Jarkko Laine. *Beginning Ruby on Rails E-Commerce: From Novice to Professional. New York: Apress, 2006.*
- Holzner, Steven. *Beginning Ruby on Rails. Hoboken, NJ: Wrox Press, 2007.*
- Jones, M. Tim. *GNU/Linux Application Programming. 2<sup>nd</sup> ed. Boston: Cengage Course Technology. 2008.*
- Lecky-Thompson, Ed, Steven D. Nowicki, and Thomas Myer. *Professional PHP 6. Hoboken, NJ: Wrox Press, 2009.*
- Lenz, Patrick. *Simply Rails 2. SitePoint, 2008.*
- Masters, Jon, and Richard Blum. *Professional Linux Programming. Hoboken, NJ: Wrox Press, 2007.*
- Matthew, Neil, and Richard Stones. *Beginning Linux Programming. 4<sup>th</sup> ed. Hoboken, NJ: Wrox Press, 2008.*
- McArthur, Kevin. *Pro PHP: Patterns, Frameworks, Testing and More. New York: Apress, 2008.*
- Meeker, Heather J. *The Open Source Alternative: Understanding Risks and Leveraging Opportunities. Indianapolis: John Wiley & Sons, 2008.*
- Negus, Christopher. *Linux Bible 2009 Edition: Boot Up to Ubuntu, Fedora, KNOPPIX, Debian, SUSE, and 13 Other Distributions. Indianapolis: John Wiley & Sons, 2009.*

- Petersen, Richard. *Linux: The Complete Reference. 6<sup>th</sup> ed.* New York: McGraw-Hill/Osborne, 2008.
- Powers, David. *PHP Object-Oriented Solutions.* New York: Friends of Ed, 2008.
- Rajshekhar, A.P. *Building Dynamic Web 2.0 Websites with Ruby on Rails: Create Database-Driven Dynamic Websites With This Open-Source Web Application Framework.* Birmingham, UK: Packt Publishing, 2008.
- Rappin, Noel. *Professional Ruby on Rails.* Hoboken, NJ: Wrox Press, 2008.
- Rosebrock, Eric, and Eric Filson. *Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP Working Together.* Alameda, CA: Sybex, 2004.
- Sheong, Chang Sau. *Ruby on Rails Web Mashup Projects: A Step-By-Step Tutorial to Building Web Mashups.* Birmingham, UK: Packt Publishing, 2008.
- Smith, Elliot, and Rob Nichols. *Ruby on Rails Enterprise Application Development: Plan, Program, Extend: Building a Complete Ruby on Rails Business Application from Start to Finish.* Birmingham, UK: Packt Publishing, 2007.
- Soyinka, Wale. *Linux Administration: A Beginner's Guide. 5<sup>th</sup> ed.* New York: McGraw-Hill/Osborne, 2009.
- Suehring, Steve, Tim Converse, and Joyce Park. *PHP 6 and MySQL 6 Bible.* Indianapolis: John Wiley & Sons, 2009.
- Telles, Matt, and Julie C. Meloni. *PHP 6 Fast & Easy Web Development.* Boston: Cengage Learning, 2008.
- Valade, Janet, Tricia Ballad, and Bill Ballad. *PHP & MySQL Web Development All-in-One Desk Reference for Dummies.* Indianapolis: John Wiley & Sons, 2008.
- Valade, Janet. *PHP & MySQL for Dummies. 3<sup>rd</sup> ed.* Indianapolis: John Wiley & Sons, 2007.
- van Vugt, Sander. *Beginning the Linux Command Line.* New York: New York: Apress, 2009.
- Vaswani, Vikram. *PHP Programming Solutions.* New York: McGraw-Hill/Osborne, 2007.

- Williams, Justin. *Rails Solutions: Ruby on Rails Made Easy*. New York: Friends of Ed, 2007.
- Yank, Kevin. *Build Your Own Database-Driven Website Using PHP & MySQL*. 4th ed. San Francisco: SitePoint, 2009.

## Other References

The following resources may be found **outside** of the ITT Tech Virtual Library.

### Web sites

- PHP Web site:

<http://php.net/index.php> (accessed 2/3/2010)

Home page of site maintained by The PHP Group providing an introductory tutorial to the PHP scripting language, an online manual, and links to example archive sites and other resources

- Apache Software Foundation:

<http://www.apache.org/> (accessed 2/3/2010)

The Apache Software Foundation provides support for the Apache community of open-source software projects.

- MySQL Web site:

<http://www.mysql.com/> (accessed 2/3/2010)

Site maintained by Oracle Corp. providing news, webinars, and training opportunities on the MySQL open source database

- Fedora Project Web site:

<http://fedoraproject.org/> (accessed 2/3/2010)

Site providing documentation, a wiki, a user forum, and other resources for the Fedora community

- Ruby on Rails Web site

<http://rubyonrails.org> (accessed 2/3/2010)

Site for the Ruby on Rails community providing downloads, documentation, screencasts, a wiki, and other resources.

All links to Web references outside of the ITT Tech Virtual Library are always subject to change without prior notice.

## Course Evaluation and Grading

### Evaluation Criteria Table

The final grades will be based on the following categories:

CATEGORY	WEIGHT
Assignments	15%
Quizzes	15%
Labs	20%
Project	15%
Exam I	20%
Exam II	15%
<b>Total</b>	<b>100%</b>

Note: Students are responsible for abiding by the Plagiarism Policy.

### Grade Conversion Table

The final grades will be calculated from the percentages earned in the course, as follows:

A	90-100%	4.0
B+	85-89%	3.5
B	80-84%	3.0
C+	75-79%	2.5
C	70-74%	2.0
D+	65-69%	1.5
D	60-64%	1.0
F	<60%	0.0

*(End of Syllabus)*