



Western Technical College

## 10152113 Advanced Topics in Programming

### Course Outcome Summary

#### Course Information

<b>Description</b>	This course covers advanced topics in programming. A broad array of topics covered may include: object-orientated design, 3-tier design, cloud hosting, web services, algorithms, performance, software testing, and version control.
<b>Career Cluster</b>	Information Technology
<b>Instructional Level</b>	Associate Degree Courses
<b>Total Credits</b>	3
<b>Total Hours</b>	72

#### Pre/Corequisites

Prerequisite	10154178 IT Project Analysis
Prerequisite	10152153 Introduction to Java
Prerequisite	10152191 Database Development with .NET

#### Textbooks

*PHP and MySQL for Dynamic Web Sites*. 5th Edition. Copyright 2017. Ullman, Larry. Publisher: Pearson. ISBN-13: 978-0-13-430184-6. Required.

#### Learner Supplies

Class materials \$60. **Vendor:** To be discussed in class. Required.

#### Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Cultivate Passion: Increase Self-Awareness
3. Live Responsibly: Develop Resilience
4. Live Responsibly: Embrace Sustainability

5. Live Responsibly: Foster Accountability
6. Refine Professionalism: Act Ethically
7. Refine Professionalism: Improve Critical Thinking
8. Refine Professionalism: Practice Effective Communication

## Course Competencies

### 1. Explore tools and processes used by developers.

#### Assessment Strategies

- 1.1. Demonstration

#### Criteria

*You will know you are successful when*

- 1.1. you use a virtual machine as a development environment.
- 1.2. you use Git to keep track of code revisions.
- 1.3. you install and configure an Apache web server in a virtual machine.

#### Learning Objectives

- 1.a. Use a virtual machine for simulating a production environment.
- 1.b. Use a code version control system.
- 1.c. Install and configure an application server.
- 1.d. Explore the LAMP stack (Linux, Apache, MySQL, PHP).
- 1.e. Apply Linux Terminal Commands.
- 1.f. Explore NodeJS as a development tool (if time permits).

### 2. Interpret data in various formats.

#### Assessment Strategies

- 2.1. Program

#### Criteria

*You will know you are successful when*

- 2.1. you write a program that parses data in a text file to encode the data in XML, CSV, and JSON formats.
- 2.2. you write a program that uses recursion to process hierarchical data.
- 2.3. you write a program that uses regular expressions to search data to find text that matches a particular pattern.
- 2.4. you write a program that parses data in a text file to decode the data in XML, CSV, and JSON formats.
- 2.5. you write a program that uses SQL to retrieve data from a database.

#### Learning Objectives

- 2.a. Explore ways to parse text files in various formats.
- 2.b. Identify how objects are used to model data.
- 2.c. Explore how data is encoded and decoded in XML, CSV, and JSON formats.
- 2.d. Identify how recursion is used to process hierarchical data.
- 2.e. Identify how data is summarized/aggregated.
- 2.f. Identify how a program uses regular expressions.

### 3. Evaluate features of various programming languages.

#### Assessment Strategies

- 3.1. Program

#### Criteria

*You will know you are successful when*

- 3.1. you write a program to demonstrate understanding of object-oriented techniques.
- 3.2. you write a program to demonstrate functional and asynchronous programming techniques.
- 3.3. you write a program that incorporates error handling.

### **Learning Objectives**

- 3.a. Explore features of various object-oriented programming languages, including variable scope, static and dynamic features, loose and strong typing.
- 3.b. Explore functional programming.
- 3.c. Explore asynchronous programming.
- 3.d. Demonstrate the use of error handling in a program.

## **4. Explore programming concepts for developing programs.**

### **Assessment Strategies**

- 4.1. Written Product

### **Criteria**

*You will know you are successful when*

- 4.1. you create a program that uses a well-documented API.
- 4.2. you create an API and use it in a program.

### **Learning Objectives**

- 4.a. Demonstrate abstraction by refactoring a program.
- 4.b. Write a program that demonstrates modular coding principles.
- 4.c. Describe the Single Responsibility Rule.
- 4.d. Compare features of various programming languages.
- 4.e. Explore asynchronous programming (AJAX).
- 4.f. Design and develop an API.
- 4.g. Engage in unit testing and test-driven development.
- 4.h. Write a program that uses a well-documented API.

## **5. Investigate the HTTP protocol.**

### **Assessment Strategies**

- 5.1. Program

### **Criteria**

*You will know you are successful when*

- 5.1. you write a program that demonstrates the use of HTTP request methods.
- 5.2. you write a program that demonstrates the use of HTTP headers.
- 5.3. you write a program that demonstrates the use of HTTP query string parameters.

### **Learning Objectives**

- 5.a. Describe HTTP request methods.
- 5.b. Explain HTTP headers.
- 5.c. Explain HTTP query string parameters.
- 5.d. Use HTTP with AJAX.

## **6. Examine databases design and development.**

### **Assessment Strategies**

- 6.1. Program

### **Criteria**

*You will know you are successful when*

- 6.1. you write a program that uses a MySQL database.
- 6.2. you write a program that models hierarchical data in a relational database.

### **Learning Objectives**

- 6.a. Work with MySQL and PHPMyAdmin.
- 6.b. Create databases.
- 6.c. Query databases.
- 6.d. Model Hierarchical data in a relational database.
- 6.e. Create backups of databases.

## **7. Explore integration of applications with web services and databases.**

## **Assessment Strategies**

7.1. Project

### **Criteria**

*You will know you are successful when*

- 7.1. you create a program that consumes a web service.
- 7.2. you create a database-driven web-service.
- 7.3. you explain how HTTP is used as an integration tool.

### **Learning Objectives**

- 7.a. Write a program that consumes a web service.
- 7.b. Design and develop a database-driven web service.
- 7.c. Describe how HTTP is used as an integration tool.
- 7.d. Build and consume RESTful web services.

## **8. Develop programs using a server-side technology.**

### **Assessment Strategies**

8.1. Program

### **Criteria**

*You will know you are successful when*

- 8.1. you write a program that uses a server-side technology to generate HTML.
- 8.2. you write a program that uses server-side technology to interact with a database.
- 8.3. you write a program that uses server-side technology that uses the HTTP protocol.

### **Learning Objectives**

- 8.a. Identify how to generate HTML with server-side technology.
- 8.b. Identify ways to interact with a database using server-side technology.
- 8.c. Use server-side technology with the HTTP protocol.

## **9. Develop programs using a client-side technology.**

### **Assessment Strategies**

9.1. Program

### **Criteria**

*You will know you are successful when*

- 9.1. you write a program that uses client-side technology to retrieve data from a server.
- 9.2. you write a program that displays data to the end-user.

### **Learning Objectives**

- 9.a. Fetch data from a server using client-side technology.
- 9.b. Display data to the end-user using client-side technology.

## **10. Create a practical application that incorporates advanced programming concepts.**

### **Assessment Strategies**

10.1. Project

### **Criteria**

*You will know you are successful when*

- 10.1. you write a program using various development tools.
- 10.2. you write a program that processes and displays structured data.
- 10.3. you write a program that incorporates various design principles.
- 10.4. you write a program that uses a modular approach to development.

### **Learning Objectives**

- 10.a. Write programs that incorporates various tools, data formats, language features, and design principles.