

## **Course Title: ITAP 4371: E-Commerce**

**Semester Credit Hours:** 3 (3,0)

### **I. Course Overview**

The primary objective of this course is to expose students to the advanced use of information technology in the design and implementation of Web-based business applications to support e-commerce. The course presents concepts, methodology, and tools for designing, implementing, and management of e-commerce applications in a business-to-business paradigm..

### **II. PMU Competencies and Learning Outcomes**

This course helps students develop proficiency in the design and development of e-commerce applications within the framework of business-to-business paradigm. Students develop both the conceptual basis and the practical skills in the design and implementation of Web-based applications to support the core and mission-critical Internet-based business processes of an organization. Additionally, this course makes extensive use of the PMU technology infrastructure to provide communication between faculty and students. While the course does not include a structured laboratory component, out-of-class projects are assigned to ensure students gain the necessary experience and skill developing e-commerce applications. The course includes individual as well as group projects and provide opportunities for the presentation and defense of their designed solution.

### **III. Detailed Course Description**

The course is designed to provide coverage of technologies available to design, develop, implement, and manage business information processing applications that support e-commerce in a business-to-business, as opposed to business-to-consumer, paradigm. The course begins with an overview of the E-Commerce framework, highlighting model-view-controller (MVC) design paradigm and component-based implementation framework (for example J2EE or .Net). It then introduces students to the use of an integrated development environment based on J2EE and/or .Net framework (for example IBM WebSphere Studio or Visual Studio .Net) in the development of various components that make up an E-Commerce application. Next, students learn to develop server-side components to implement the controller and model layers of the MVC paradigm using technologies such as JavaBeans, Web Services, Servlets, Active Server Pages, Java Server Pages and Java Server Faces. Connectivity of the server-side components to back-end databases is introduced next. Finally, the development of client-side components (View layer of the MVC paradigm) via HTML and XML is introduced. unit testing of each component is emphasized throughout the development cycle. Students acquire these skills via a series of mini-projects, which build up to a complete e-commerce application. The mastery of these concepts and skills is demonstrated via an end-of-term team project.

This course may be taught using one of the two competing object-oriented technologies, namely industry-standard J2EE platform or Microsoft's .Net framework. The choice of technology should depend largely on student's programming background (Java versus C++ or C#), industry demands, and availability of faculty with requisite skills. For these reasons, the topical outline is left generic enough to be compatible with either technology. J2EE is currently the most commonly used framework for e-commerce applications. However, Microsoft's .Net framework is gaining momentum.

#### **IV. Requirements Fulfilled**

This course is required for all students majoring in Information Technology in the College of Information Technology. It is also recommended as an elective for students majoring in computer science and management information systems. It should be taken no earlier than the first semester of the senior year.

#### **V. Required Prerequisites**

GEIT 1411: Computer Science I  
GEIT 1412: Computer Science II  
GEIT 3341: Database Design  
ITAP 3471: Web Server Administration.

#### **VI. Learning Outcomes**

In this course, students learn:

- To become familiar with e-commerce framework and its design considerations.
- To become familiar with n-tier framework within the MVC design paradigm for designing e-commerce applications.
- To become proficient in the design, development and implementation of server-side components that constitute an e-commerce enterprise application with mission-critical functionality within an n-tier framework
- To develop proficiency in the use of software platform (for example J2EE or .Net) for the development and operation of medium- to large-scale enterprise applications.
- To acquire skills in the use of one commonly used integrated development environment for example IBM WebSphere for J2EE or Visual Studio .Net for the .Net framework.
- To acquire an appreciation for issues relevant to the design of enterprise-level e-commerce applications.
- To acquire the communication, leadership and teamwork skills necessary to work in teams, or in charge of teams, that are responsible for implementing mission-critical e-commerce applications.

## VII. Assessment Strategy

Student's performance in this course may be assessed on the basis of:

- Three examinations, including two term and one comprehensive final examination. Each examination is an applied, "hands-on" mini project to be completed within allotted time under supervision in a computer lab setting. Term examinations assess mastery of E-Commerce design principles and specific component development while the final examination should be designed to test skills for putting together a simplified e-commerce application that includes development of all MVC components.
- At least five out-of-class application development exercises. The assignments, to be accomplished in teams of 2-3 students, provide the student with "hands-on" experience analyzing, designing and constructing Web-based solutions for business. One comprehensive final team project to be completed outside of class
- Each student is responsible for four professional reading assignments during the term. The instructor is evaluate summaries and critiques of these readings, which are based on recent articles recommended by the instructor from on-line or printed sources.

Relative weights assigned to these items in determining student's final grade are suggested as follows:

- The two term examinations each account for 20% of the grade. The final examination accounts for 20% of the grade. Combined, the three examinations account for 60% of the grade.
- Laboratory exercises account for 20% of the grade.
- Final team project accounts for 15% of the grade.
- Professional reading assignments account for 5% of the final grade.

The examinations are designed to assess the mastery of concepts, methodology, and tools discussed in class and assigned laboratory exercises. Assigned laboratory exercises are designed to provide students, working in teams, an opportunity to gain "hands-on" experience analyzing, designing and implementing various components of e-commerce applications. The final team project is designed to permit students to apply concepts, methods, and tools learned in class to support a real system. The project requires students, working in teams, to design and implement a complete Web-based, n-tiered e-commerce application of reasonable complexity. This may be an application simulated to expose students to what a real-system would entail or it may be a real application for a real client. In either case, the grade on the final project depends on the quality of completed project, written technical documentation, and an

oral presentation of the implemented architecture. The final project is thus designed to assess competency in performing various tasks related to the design, development and implementation of a complete e-commerce application. These assessments are complemented by class discussions on professional readings taken from various industry sources to illustrate “best practices.”

## **VIII. Course Format**

This course utilizes a mix of in-class lectures, discussions, and software demonstrations designed to help students learn the various tasks involved in designing, installing, configuring, securing, and monitoring an e-commerce application. While class meetings are utilized to emphasize conceptual foundation in topics related to these tasks, software demonstrations are used to provide students with hands-on training in performing these tasks. For best results, this course is taught in a lab-environment where students can follow the instructor during software demonstrations and discussion of key development strategies. Initial class meetings introduce students to the theoretical concepts. Most of the later meetings are used for laboratory software demonstrations geared at helping students master skills for designing and developing various E-Commerce application components. A running case study is used for this purpose so that students see an end-to-end development cycle. Students are expected to attend three hours of lecture (includes discussion/software demonstrations) per week.

In addition, the instructor should consider creating a Web site for this course using Web technologies such as WebCT or BLACKBOARD. At minimum, the site should include:

- Course syllabus
- Lecture material (for example PowerPoint slides, lecture notes, etc.). These should be placed on the site ahead of class meeting so that students may use the material to prepare for the lecture
- Software demonstration exercises completed in class
- Out-of-Class assignments and end-of-term project
- Keys to exams (after students have completed them)
- Solution to Laboratory Exercises (after graded assignments have been returned)
- Mechanism for students to digitally submit their assignments
- Course calendar
- Mechanism to communicate electronically (for example e-mail)
- Discussion groups
- Students course performance measures

**Classroom Hours (3 hours per week)**

**Class: 3**

**Lab: 0**

## **IX. Topics to be Covered**

- A. Introduction to the e-commerce application development landscape
  1. E-business application framework
  2. MVC design paradigm
  3. N-tier development framework
  4. Development platforms and roles of components
  5. Competing technologies - J2EE and .Net
- B. Development of Web-based and middleware components
  1. Developing server-side components
    - a. Controllers (Servlets, ASP)
    - b. Database connectivity (JDBC, ADO .Net)
    - c. Encapsulating business rules (JavaBeans, EJBs, Web services)
    - d. XML as an information exchange mechanism
  2. Developing client-side components
    - a. Views or presentation components (HTML, JSP, ASP)
    - b. Application clients, applets, Web-based interactions
    - c. Validation and user authentication
- C. Test, debug and deploy
  1. Unit testing
  2. Debugging tools
  3. Deployment environment to include Web and application servers
- D. Securing e-commerce application
  1. Identify threats and vulnerabilities
  2. Understand various aspects of security such as authentication and authorization.
  3. Symmetric and asymmetric encryption, SSL, HTTPS, Certificates
  4. Mechanism for securing applications
    - a. Declarative
    - b. Programmatic
  5. Test and deploy secured application

## **X. Laboratory Exercises**

Students are assigned one out-of-class application development exercise every three weeks. These hands-on exercises are expected to be done in a team setting (generally 3-4 students/team) and are designed to illustrate various development concepts covered during lecture meetings. Thus, students are expected to complete about 5 such exercises. Collectively, these exercises enable students to learn the several steps involved in the design, development and implementation of a relatively complex e-commerce application. The following major areas should be covered in these exercises.

- Identify and design components for an e-commerce application based on MVC paradigm and n-tier architecture. This would involve architecting an application to distribute its presentation, business logic, data access and storage logic across multiple layers.
- Design, develop, and test server-side components. This would include components to perform the role of controller and that encapsulate business rules as well as connectivity to data stores.

- Design, develop and test client-side components to exchange information with users or user-applications.
- Unit test and debug application
- Implement declarative and programmatic security in application.

## **XI. Technology Component**

- A. In class, the instructor makes use of state-of-the art multimedia projection equipment and software. These are used to project slides and Web-based content relevant to the design of E-Commerce applications.
- B. In class, in the laboratory setting, the instructor makes use of a commercial integrated development environment based on J2EE or .Net framework to demonstrate various tasks involved in successful design and development of an enterprise-level, mission-critical E-Commerce application.
- C. Outside class, the instructor uses Web-based course management software (for example WebCT, BLACKBOARD) to interact with students as described under course format section.

## **XII. Special Projects/Activities**

An end-of-term team project is required in this course. This project is designed to permit students to apply concepts, methods, and tools learned in class to support a real system. The project requires students, working in teams, to design and implement a complete Web-based, n-tiered e-commerce application of reasonable complexity. This may be a simulated application designed to expose students to tasks involved in assembling a real-system or it may be a real application for a real client. In either case, student teams are expected to:

- Design, test, and deploy the application,
- Prepare a complete technical manual, and
- Make an oral presentation of their design architecture to a panel of judges comprising of the instructor and other faculty members or client.

The final project is thus designed to assess competency in performing various tasks related to the design, development and implementation of a complete E-Commerce application.

### **XIII. Textbooks and Teaching Aids**

#### **A. Required Textbook**

1. If course is based on J2EE platform:

Budi Kurniawan; *Java for the Web with Servlets, JSP, and EJB: A Developer's Guide to Scalable J2EE Solutions*; New Riders; (Pearson Education); 2002  
ISBN: 073571195X

2. If the course is based on .Net framework:

Lyn Robison; *Implementing B2B Commerce with .NET: A Guide for Programmers and Technical Managers*; Publisher: Addison Wesley Professional; 2002  
ISBN: 0201719320

#### **B. Alternative Textbooks**

- 1 If the course is based on J2EE platform:

Dale Nilsson and Louise Mauget; *Building J2EE Applications with IBM WebSphere*; Wiley Publishing, Inc.; 2003  
ISBN: 0471281573

Rod Johnson; *Expert One-on-One J2EE Design and Development*; Wrox Press; 2002  
ISBN: 0764543857

2. If the course is based on .Net framework:

Dino Esposito; *Programming Microsoft ASP.Net*; Microsoft Press; 2003  
ISBN: 0735619034

Dave Mercer; *Programming the Web with ASP.Net*; McGraw-Hill; 2004  
ISBN: 0072949384

#### **C. Supplemental Print Materials**

As available from publisher.

Trade publications such as JavaWorld, .Net Developer

#### **D. Supplemental Online Materials**

As available from publisher.

Recent articles, case studies, and professional readings taken from online industry sources such as Microsoft, Sun, Oracle, and IBM websites. The instructor provides the links to these resources, which are freely available.