

**Indiana University
Request for a Certificate Program**

Campus: Indiana University Purdue University Indianapolis

Proposed Title of Certificate Program: E-Commerce Development Certificate

Projected Date of Implementation: Spring 2002

1. Why is the certificate needed (Rationale).

Despite some high-profile failures, the North American Internet retailing segment surpassed \$29.3 billion in 2000, a 75 percent increase over 1999 revenue, according to the Gartner Group. The Gartner Group also estimates that e-commerce sales growth will exceed 600% over the next five years. The E-Commerce Development Certificate program recognizes that there are a significant number of application developers that need re-tooling to meet the needs of this ever-growing e-commerce environment. Many developers are highly skilled in their current environment but need some assistance to make the leap into the world of Web-based application development. Certainly, many of the application development fundamentals hold up regardless of the application platform being used but there are a number of new challenges that must be addressed in a Web world. These include such things as object-oriented techniques, Web-enabled databases, Internet level security, Web programming languages, and usability guidelines in a global environment.

The E-Commerce Development Certificate emphasizes the object-oriented approach to application development. In particular, the techniques of the object-oriented Unified Modeling Language (UML) are used throughout the program as UML is revolutionizing the development of software and business systems for Web-based applications. Rational Rose, a major vendor in the area of Web-based tools, is just one of many companies that have incorporated UML into their product offerings. Designers who master UML net significant productivity gains primarily through the development of reusable components. Nevertheless, UML has a steep learning curve and the E-Commerce Development Certificate can significantly reduce that learning curve.

This program also addresses the need for speed to market and the need for flexible scheduling. The Certificate can be completed within one year with applicable benefits being accumulated along the way. Students can take 1-2 courses per semester based on their particular needs and availability. Using the Web as a delivery mechanism allows students access to course materials at their convenience. Course content is maintained in an environment that is available 23x7. Web-based support and collaboration tools further enhance the non-traditional student's learning experience.

2. List the major topics or curriculum of the certificate.

Web-Based Analysis and Design, CPT 213, offers students the object-oriented tools and techniques needed for the analysis and design process for Web-based applications. UML concepts will be introduced and re-enforced through Web-based projects. This course is equivalent to CPT 254, a classroom-based course. The objectives of this course include:

- Demonstrate an understanding of the terminology of systems analysis and design
- Demonstrate application of object-oriented approaches to systems development through hands-on activities
- Demonstrate and develop problem solving skills in a business environment

- Demonstrate the use of modeling techniques and tools
- Develop a web-based prototype

Advanced Web Site Design, CPT 312, is designed to give students the tools and techniques necessary to maximize the effectiveness of deploying e-commerce Web applications. Both client and server side strategies will be addressed. This course is not focused on coding activities but rather on applying optimal Web design strategies. These strategies cover internal design issues like security, reusability, and architecture and external design issues like user interfaces, load times and multimedia. The concepts of these advanced design topics will be re-enforced with Web-based projects. The objectives of this course include:

- Demonstrate understanding of Web components
- Demonstrate understanding of Web-based security strategies (SSL, encryption, authentication)
- Demonstrate application of different navigational strategies
- Define and utilize an optimal architectural structure
- Define and apply techniques for optimizing speed of Web page delivery
- Develop Web-based multimedia components.
- Demonstrate application of reusability strategies
- Display understanding of handling implementation issues

XML, CPT 412, familiarizes students with the Extensible Markup Language (XML) and teaches them how to build Web applications by using XML. Students will learn how to display dynamic XML data in a Web browser by using data binding and the Document Object Model. This course assumes no prior knowledge of XML. The objectives of this course include the following:

- List the uses and benefits of XML on a Web site.
- Create well-formed and valid XML documents.
- Create an XML schema.
- Use XSL to display XML data in a Web browser.
- Use XSL to transform XML data into a different format.
- Display dynamic XML data in a Web browser by using data binding and the Document Object Model.
- Use ASP and ADO to read data from a data source and store it as XML.
- Add, delete, and update data on the client by using XML and saving data to a database on the server

Web Programming. Students have the option of pursuing a two-course sequence in either Java or a Microsoft .Net environment.

Java Thread:

Java, CPT 270, is an introduction to problem-solving techniques, program design and development, programming logic, and remote terminal use. The course covers utilization of the JDK Java 2 Platform on a beginning level. The objectives of this course include the following:

- Apply problem-solving techniques in designing computer applications
- Use control structures correctly
- Successfully create programs using the Java development environment
- Be able to explain basic object-oriented terminology
- Apply object-oriented modeling and design elements to computer programs

Java Server Pages, CPT 329, covers the Web-based application development process using both Java servlets and Java Server Pages. The advantages of these two technologies will be discussed and demonstrated. The objectives of this course include the following:

- Demonstrate working knowledge of JSP scripting elements
- Demonstrate application of generated servlets
- Demonstrate use of JavaBeans with JSP
- Create custom JSP Tag Libraries
- Integrate Servlets and JSP
- Create JDBC – Database Connectivity

ASP .Net Thread:

ASP .Net, CPT 242, will provide the basics for understanding and applying ASP .Net approach to Web projects. Visual Basic will be used as the ASP .Net platform. The objectives of this course include the following:

- Demonstrate knowledge of ASP.Net programming fundamentals
- Demonstrate understanding of Server Controls and WebForms and how they interact with events, and the rendering model
- Demonstrate use of Validation Controls
- Create Database Access via ADO.net
- Demonstrate understanding of Session State fundamentals

Advanced ASP .Net, CPT 347, will cover the application of ASP .Net applications in an e-commerce environment. Reusability and architectural considerations will be major themes. The objectives of this course include the following:

- Demonstrate use of ADO+ to connect to XML, arrays and non-database sources
- Create Web Services
- Build standard libraries of reusable components
- Demonstrate use of Caching Output, Fragment Caching and Direct Cache Manipulation
- Demonstrate use of config.web
- Demonstrate use of global.aspx
- Demonstrate use of Security and Authentication components

Advanced E-Commerce Development, CPT 436, will provide students the opportunity to apply the concepts and techniques from the prior Certificate courses to a real world opportunity. Students will develop a data-driven e-commerce site for a small to medium size local company.

- Design an effective and efficient web prototype, including well designed navigational paths
- Determine data needs and design and implement appropriate database structure
- Select the best programming framework to address business needs
- Design and implement a data driven solution

3. List the major student outcomes (or set of performance-based standards for the proposed certificate).

The major goal of this program is to provide an efficient and effective method for transitioning non-Web developers to the world of e-commerce development. Participants completing this program will have a solid foundation in the techniques used for Web-based application development. All phases of the application development life cycle will be covered including analysis, design, programming, usability testing and implementation. The hands-on nature of this program will allow graduates to immediately apply the knowledge and techniques learned to real world e-commerce applications.

A secondary goal of this program is to upgrade the skills of current Web developers in specific areas. The ever-changing technologies of the Web environment create an on-going challenge to stay current as a developer. This program will provide a viable option for current Web developers to stay current with technology.

4. Explain how student outcomes will be assessed (course-embedded assessments, graduate follow-up, employer survey, standardized tests, etc.):

The following means will used to evaluate the student's declarative and procedural knowledge gained as they advance through the certificate program:

- Web-based projects. Students will be required to build various Web components to re-enforce the techniques and approaches taught.

- Online interactive quizzes and examinations will be conducted that cover Web technologies and techniques.
- The students will be required to maintain an online portfolio during the certificate program. The portfolio will be evaluated at the completion of the fifth course.

5. Describe the student population to be served.

The E-Commerce Development Certificate is targeted to individuals and companies attempting to transform their current application development skills to Web-based platforms. This program is hands-on and requires that students already have at least 2-3 years of application development experience. Upon completion of the E-Commerce Development Certificate, students will have the skill and knowledge to build and maintain data driven e-commerce sites.

The E-Commerce Certificate program also addresses the need to accommodate the demanding work and family schedules of non-traditional students. The proposed program consists of six integrated courses offered entirely over the Web. Courses are offered asynchronously, allowing students access to course materials at a time that fits their particular schedule.

6. How does this certificate complement the campus or departmental mission?

The E-Commerce Development Certificate Program will complement the mission of the Department of Computer Technology by providing quality multimedia distributed education for a larger, more diverse student population from a variety of working areas and cultures. The program will also create asynchronous learning opportunities for the department's student population. These courses will not only be elements of a stand-alone program, they will also be integrated into the CPT curriculum. CPT students as well as Certificate students can benefit from these courses.

The proposed certificate program will fulfill the campus mission in much the same way as it complements the goals of the computer technology department. By offering quality multimedia distributed education to large, diverse student population and engaging students in an interactive mode of training, the program will place IUPUI in a position to respond to the fast-paced technological environment, the needs of the community and the alumni within the community, and the demands of the growing global environment.

This program will also complement the mission of IUPUI by, most specifically, contributing to university efforts to develop distance distributed educational efforts. And just as the university attempts to appeal to a more comprehensive student population with members from diverse cultures, regions, and economical backgrounds, so too does the certificate program strive to attract individuals from all environments to the IUPUI campus. Whether the participants travel by interstate or electronic superhighway, the department, campus, and university will benefit from the increased visibility and accessibility created by this certificate program.

7. Describe any relationship to existing programs within Indiana University.

As far as can be determined, no other certificate program exists within the Indiana University system that presents the same content or delivery method as this proposed CPT program. The School of New Media has recently implemented a certificate program in Internet Application development. The content of the New Media program is very different than the more technically oriented E-Commerce Development Certificate. Only two of the six New Media courses (CPT 499, CSCI 220) have a technical orientation. The four remaining courses reflect the more aesthetic aspects of Internet development and include such disciplines as Art, Music and Journalism. The market for individuals receiving the New Media Certificate would be primarily in the design area. The market for individuals receiving the E-Commerce Development Certificate would be primarily in the areas of analysis, construction and implementation of e-commerce applications. Several other current IU certificate programs are in the general area of information technology but major differences exist. For instance, IU Northwest has a Certificate in Data Processing and Information Systems. This program is much more basic than the proposed certificate and has no particular emphasis in e-commerce. The CSCI Department at IUPUI offers a Certificate in Applied

Computer Science. This campus-based program “introduces computer science principles, develops practical skills in market driven software applications and prepares students to be successful with emerging technologies.” This program targets a more general audience and also does not focus on the skills and knowledge needed for developing Web-based applications.

8. List and indicate the resources required to implement the proposed program. Indicate sources, e.g., reallocations or any new resources such as personnel, library holdings, equipment, etc.).

Edward T. Sullivan, the Director of CPTOnline will be responsible for the leadership and management of this program. Mr. Sullivan has proven his capabilities through the successful development and implementation of the Information Technology Certificate program. This highly popular program has a Fall, 2001 enrollment reflecting nearly 1,200 credit hours.

For subject matter expertise, senior personnel will be deployed as follows:

<u>Faculty</u>	<u>Topics</u>
Ed Sullivan	ASP. Net
Eugenia Fernandez	XML
Joy Starks	JSP, Java Servlets
Sally Catlin	Advanced Web Site Design

Senior personnel (subject matter experts) will be responsible for instructional content creation, including soundtracks and voice clips as well as instruments for assessing student learning.

Other Personnel

Other personnel will assist the senior personnel by providing technical support including audio/video editing and the synchronization of soundtracks to visual content delivered via web pages. The School is committed to Web-based development technologies and techniques. Also, Associate faculty and student interns will assist the other senior personnel.

9. Describe any innovative features of the program (e.g., involvement with local or regional agencies, offices, etc., cooperative efforts with other institutions, etc.):

The entire certificate program will be delivered on the World Wide Web via real-time streaming, (e.g. RealAudio/Video), which has been pioneered by the Department of Computer Technology and the Cyberlab. One option will be synchronous delivery of course content via *live* broadcast utilizing real-time streaming audio/video along with web pages . The second option will be asynchronous delivery via Synchronized Multimedia and voice-annotated web pages archived on a server. Under either option, web-based evaluation techniques will be incorporated into the course offerings. Both of these Web-based techniques provide the opportunity for creating reusable learning objects. Broadcast and narrated presentations will be modularized and archive in a manner that will allow easy access for review and re-enforcement of Web-based application development techniques.

Web-based laboratory offerings will also be part of the environment. Citrix, the market leader in the Application Server Provider industry, will be used for offering remote access to server based applications like Oracle and Rational Rose. The School of Engineered pioneered the use of this product in an academic environment during the 2000 calendar year. The student response to the convenience and response of this virtual lab environment has been overwhelmingly positive. The E-Commerce Development Certificate will further exploit the capabilities of this tool.