ITE 230 Web Systems   **4 cr.**

Catalog description:

   This course provides an introduction to web systems and technologies, including an overview of architecture of a website, implementation, evaluation and testing of web-based applications and programming aspects of web development (web content development, markup languages coding, client-side and serve-side application development). Topics include understanding of Web standards, description of basic components of a website, general principles of web interface design and development, use of databases, multimedia, and structure of the interface between a website and the Internet. Social, ethical and legal issues of web usage (e-commerce, social networks, etc.) will also be discussed. Three lecture hours and three hours of scheduled laboratory per week.

Prerequisite(s): ITE100, ITE105

Course Narrative:

The emphasis of this course is on a thorough understanding of the architecture, organization and data flow through websites. Students will learn to use markup languages to design web content and analyze web-based client-side and server-side applications. The course also covers methodologies, standards, techniques, and tools that are used to create websites – from analyzing user's requirements to the creation of a website. Students will also expand their knowledge on integrating databases with web applications, error handling and validation of data in web application, understanding web services and web standards. Students will be installing, using and managing open source software packages and will become familiar with propriety software related to website development. Personal awareness of their browsing habits online would be improved.

Labs, included in the course, allow students to exercise hands-on use of markup languages used to create web pages, use of different multimedia formats in web content, and connecting to backed database using web applications. In essence, during the labs, students will be learning the concepts by following the provided instructions for hands-on practice projects at the end of each chapter. At the end of the semester they will have a functional website with database integration.

Goals:

   Upon successful completion of the course, a student should be able to do the following:

   G1: identify basic components of the web and describe popular uses of the web
   G2: describe core elements (software and hardware) of web server and client systems
   G3: understand standards and protocols used by the web
   G4: understand and utilize techniques and tools used to design and create web content

G5: describe techniques, tools, and organizational methods used to promote the web

Course Objectives:

Upon successful completion of the course, a student will have demonstrated the ability to:

O1: apply correct technical terminology when describing main components of the web;

O2: identify the main components of a website and web applications that satisfy customer needs;

O3: demonstrate ability to analyze user's requirements, choose proper techniques used to design and create web content, and demonstrate application of these techniques in practice (applying information organization techniques, creating web pages, choosing proper digital media, etc.);

O4: demonstrate awareness of web standards bodies and the ability to understand and utilize their documents and procedures;

O5: demonstrate knowledge of client-server computing and the ability to use this knowledge during implementation;

Program Objective / Course Objective matrix (For ABET Accreditation Purposes)

(The following Matrix maps the Program Objectives for Information Technology Program outlined by Accreditation Board of Engineering Technology (ABET) with the Course Objectives. The check marks below the course objective represent that those course objectives accomplish specific program objectives set forth by ABET. The program objectives that have a * in front of them means that that course does not address those program objectives.)

Program Objective	O1	O2	O3	O4	O5
PO-A: An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline.	✓			✓	✓
PO-B: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.		✓	✓		✓
PO-C: An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.		✓	✓	✓	✓
*PO-D: An ability to function effectively on teams to accomplish a common goal.					
*PO-E: An understanding of professional, ethical, legal, security and social issues and responsibilities.					
*PO-F: An ability to communicate effectively with a range of audiences.					
*PO-G: An ability to analyze the local and global impact of computing on individuals, organizations, and society.					
*PO-H: Recognition of the need for and an ability to engage in continuing professional development.					
PO-I: An ability to use current techniques, skills, and tools necessary for computing practice.	✓	✓	✓	✓	✓

Program Objective	O1	O2	O3	O4	O5
PO-J: An ability to use and apply current technical concepts and practices in the core information technologies.			✓	✓	
PO-K: An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.			✓	✓	✓
***PO-L:** An ability to effectively integrate IT-based solutions into the user environment.					
***PO-M:** An understanding of best practices and standards and their application.					
***PO-N:** An ability to assist in the creation of an effective project plan.					

Course Topics:

The column on the right hand side represents the Body of Knowledge and number of hours (in parenthesis) set forth by ABET accreditation board for accomplishing minimum required hours assigned for different categories. More information on this body of knowledge can be found in Appendix A "The IT Body of Knowledge" on Page 68 of the following document.
http://www.acm.org//education/curricula/IT2008%20Curriculum.pdf

- **How the Web Works**   **WS1(3)**, **ITF3(1), ITF4(1), NET1(1)**
    - Definitions and History
        - A Short History of the Internet
        - The Birth of the Web
        - Web Applications in Comparison to Desktop Applications
        - Static Websites versus Dynamic Websites
        - Web 2.0 and Beyond
    - Architecture and Protocols
        - A Layered Architecture
        - Internet Layer
        - Application Layer
    - The Client-Server Model
        - The Client and Server Model
        - The Request-Response Loop
        - The Peer-to-Peer Alternative
        - Server Types
        - Real-World Websites
    - How websites connected to the Internet?
    - Domain Name System (DNS)
    - Hypertext Transfer Protocol (HTTP)
    - Web Servers
        - Operating Systems
        - Web Server Software

- Backend Engine
- Scripting Software
  - Security implications of the Web architecture   **WS5(1), IAS1(1)**
    - Technical aspects
    - Human factor

- **Introduction to Hypertext Markup Language (HTML)**   **WS1(1), WS4(2)**

  - What Is HTML and Where Did It Come from?
  - HTML Syntax
  - Semantic Markup
  - Structure of HTML Documents
  - HTML5 Semantic Structure Elements
  - HTML Validation

- **Introduction to Cascading Style Sheets (CSS)**   **WS1(2)**
  - What Is CSS?
  - CSS Syntax
  - Location of Styles
  - Selectors
  - The Cascade: How Styles Interact
  - The Box Model
  - CSS Text Styling
  - CSS Validation

- **HTML Tables and Forms**   **WS1(1), WS2(1), WS4(2)**
  - Introducing Tables
    - Basic Table Structure
    - Spanning Rows and Columns
    - Additional Table Elements
    - Using Tables for Layout
  - Styling Tables
    - Table Borders
    - Boxes and Zebras
  - Introducing Forms
    - Form Structure
    - How Forms Work
    - Query Strings
    - The <form> Element
  - Form Control Elements
    - Text Input Controls
    - Choice Controls
    - Button Controls
    - Specialized Controls
    - Date and Time Controls
  - Table and Form Accessibility
    - Accessible Tables

- ▪ Accessible Forms

- **Web Digital Media**   WS3(4)
    - o Digital Representations of Images
    - o Color Models
    - o Image Concepts
    - o File Formats
        - ▪ (JPEG, GIF,PNG, SVG, Other Formats)
    - o Audio and Video
        - ▪ Media Concepts
        - ▪ Browser Video Support
        - ▪ Browser Audio Support
        - ▪ HTML5 Canvas

- **Client-Side Programming**   WS1(2), IPT4(1)
    - o Components of Dynamic Webpage
    - o Java Virtual Machine
    - o What Is JavaScript and What Can It Do?
    - o JavaScript Design Principles
    - o Where Does JavaScript Go?
    - o Use of Javascript plugins/Library
    - o JavaScript Events
    - o Forms

- **Introduction to Server-Side Programming**   WS1(3) , IPT2(1)
    - o What Is Server-Side Development?
    - o Web Server's Responsibilities
    - o Data and Control Flow in Server-Side Application
    - o Quick Tour of PHP

- **Working with Databases**   WS1(1), WS4(1), IM2(2)
    - o Databases and Web Development
        - ▪ The Role of Databases in Websites
        - ▪ Database Design
    - o Structural Query Language (SQL)
    - o Database APIs
    - o Accessing Database inside Server Program
    - o Sample Database Techniques on website
    - o Error Handling and Validation

- **Managing Website**   WS2(1), WS3(1)
    - o Administration and Management of Website
    - o Passing Information between Web pages
    - o W3C Web Standards
    - o Web Standards in terms of Specifications, guidelines, software, and tools

- **Web Interface Design**   WS2(3)

- o Real-World Web Software Design
    - Challenges in Designing Web Applications
- o Principle of Layering
    - What Is a Layer?
    - Consequences of Layering
    - Common Layering Schemes
- o Presentation Patterns
    - Model-View-Controller (MVC) Pattern
    - Front Controller Pattern

- **Extensible Markup Language (XML) Processing and Web Services**   **WS1(2)**
    - o Understanding XML Syntax
    - o XML Processing
        - XML Processing in Client-Side
        - XML Processing in Server-Side
    - o An Example Web Service

- **Social Network Integration**   **WS6(2)** *(not core)*
    - o What are Social Networks
        - Common Characteristics
    - o Social Network Integration
    - o Working in Web Development
        - Types of Web Development Companies
        - Roles and Skills

Student Experiences:

Laboratory exercises
Conducted as part of the scheduled laboratory sessions, labs are an integral component of the course, serving to reinforce the concepts and techniques presented in lectures. Labs include
- Web page design and creation I
- Web page design and creation II (includes scripting)
- Website content design (includes usage of authoring tools)
- Vulnerability assessment of a website and web pages
- Web applications and social websites
- Analysis of existing websites and writing reports

Labs
All lab reports must conform to guidelines announced in class. Projects will be assessed and graded against the Project Implementation rubric.

Quizzes, Tests and Examinations
There will be four quizzes (each covering a major topic), a midterm, and a cumulative final. Quizzes and exams will include multiple choice and problem solving tasks.

Final Grade

Final grade will be determined on the basis of the following approximate weights:

Grading Categories	Weights (%)
Laboratory exercises	25
Projects	25
Quizzes	15
Midterm exam	15
Final exam	20
Total	100

Student Experiences by Course Outcome (Objective) matrix:

	Labs	Projects	Quizzes	Midterm exam	Final exam
CO1	✓		✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓		
CO5		✓			

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