

CSP 584

Enterprise Web Applications

Syllabus

Instructor: Dr. Atef Bader
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Grading:	Exam	30%
	Final Project	30%
	5 Assignments	40%

Textbooks:

- Steelman, A. and Murach, J. (2008). Murach's Java Servlets and JSP, 2nd Edition. Mike Murach & Associates. [ISBN: 9781890774448]



- Tidwell, J., Brewer, C., Valencia, A. 2020. Designing Interfaces (3rd Edition). Sebastopol, CA: O'Reilly Media. [ISBN: 978-1492051961]



- Klingman, L. 2023. React Programming: The Big Nerd Ranch Guide. Indianapolis, IN: Pearson Technology Group. [ISBN: 978-0137901692]



Course Description

This course discusses the architectures, design methodologies, and technologies used in the Full-Stack development of the object-oriented enterprise web applications. Multitier architectures, application servers, microservices, multithreading and concurrency, client-server model and MVC architecture will be discussed and analyzed. The course also discusses the application architecture, and the design process to extract, transform, and load data for document-oriented, relational, and graph database systems. Analyze and discuss the data pipeline process utilized for data collection and the creation of the data analytics reports used in effective business process management for the enterprise, Time-series forecasting for strategic planning, marketing campaigns, sentiment analysis, and focused advertisement. This course reviews the widely used user experience (UX) and user interface (UI) design patterns, and information architectures for usability engineering. The course demonstrates how usability engineering is applied in the iterative and agile software development processes to verify the quality of the software product with respect to ease of use, ease of learning, user satisfaction, and evolutionary design.

Prerequisite: CS 445

Objectives:

- Explain the n-tier architectures and demonstrate how they are utilized in building the enterprise web applications.
- Recognize and analyze the core elements of the enterprise Web application architectures
- Acquire the technical skills to utilize technologies used in the analysis, design, and development of the enterprise web applications
- Utilize the MVC architectural pattern in the design and development of the component-based and object-oriented web applications.
- Explain the impact of relational, document-oriented and graph database technologies on the enterprise web applications development and architectures
- Extract, transform and load real-time and near real-time data from different data sources for the creation of the data analytics reports
- Compare and contrast the full-stack development frameworks and technologies
- Build and deploy cloud-native microservices

- Apply UX laws, including Fitts's law, Jakob's law, and Hick's law, for building products and experiences that are more intuitive and human-centered.
- Utilize the agile and iterative development processes for scenario-based usability engineering.
- Organizing the Content of Information Architecture and Application Structure
- Compare and contrast User Experience (UX) and User Interface (UI) design patterns.
- Deploy visual design methods to promote wayfinding in software.
- Evaluate web-based technologies for software application development: markup languages, scripting languages, programming languages, and web-application frameworks.

Technologies, languages, Protocols, Frameworks, and Libraries:

- Servlets, Java Server Pages, AJAX, HTTP protocol, XML/HTML, and Sessions/Cookies
- Angular and React
- Full-Stack MEAN and MERN
- REST and GraphQL
- Python, Pandas, and Tensorflow/Keras
- Apache/Tomcat
- JavaScript, TypeScript, Node.js and Express
- Go language, Google Cloud Platform, GitHub, Docker Hub.
- DB Engines: MongoDB, Elasticsearch, MySQL, and Postgres

Topics Covered:

- Enterprise web application architectures and patterns
- Client-Server Model, MVC architectural pattern and n-tier architectures
- Full-stack development frameworks and libraries
- Object-oriented technology for enterprise web application development
- Cloud-native microservices and architecture
- Concurrency control and multithreading
- Software Frameworks and J2EE framework
- Application servers, Tomcat/Apache, and Node.js/Express
- Web architecture and technologies, HTTP Protocol, HTML, and CSS

- Java servlets, Java Server pages (JSP) and Java Beans
- JavaScript and Asynchronous JavaScript and XML (AJAX)
- JavaScript web frameworks/libraries
- Database models and systems: Document-Oriented, RDBMS, and Graph databases
- Information architecture, User Experience (UX) and User Interface (UI) design patterns
- Data analytics, real-time data collection, and data pipelines
- Utilize Generative AI (LLM: Large Language Model) to make recommendations of products, services, events, and nearby places based on customer profiles.
- Time-series forecasting, recommender, and collaborative filtering

Recommended References:

- Holmes, S., and Harber, C. (2019). Getting MEAN with Mongo, Express, Angular, and Node, 2nd Edition. Manning Publications. [ISBN: 9781617294754]
- Subramanian, V. (2019). Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node. Apress, [ISBN: 978-1484243909]
- Connolly, R. and Hoar, R. (2020) Fundamentals of Web Development, 3rd Edition. Pearson. [ISBN: 9780135863589]
- Scott, A. D., MacDonald, M., and Powers, S. (2021). JavaScript Cookbook, 3rd Edition. O'Reilly. [ISBN: 9781492055754]
- Rosenblatt, H., Systems Analysis and Design, 10th Edition, Cengage Learning. [ISBN: 9781285171340]
- Python for Data Analysis Data Wrangling with Pandas, NumPy, and IPython By Wes McKinney Publisher: O'Reilly Media Final Release Date: October 2012, [ISBN: 978-1-4493-1979-3]
- Coronel, C. and Morris, S., Database Systems: Design, Implementation, & Management, 12th Edition, Cengage Learning. [ISBN: 9781305627482]
- Richardson, C. (2018). Microservices Patterns. Manning Publications. [ISBN: 9781617294549]
- Uluca, D. (2020). Angular for Enterprise-Ready Web Applications, 2nd Edition. Packt Publishing. [ISBN: 9781838648800]
- De Voil, N. 2016. User Experience Foundations. Swindon, UK: BCS Learning & Development. [ISBN: 978-1780173498]
- Yablonski, J. 2020. Laws of UX. Sebastopol, CA: O'Reilly Media. [ISBN: 978-1492055310]

- MacDonald, D. 2019. Practical UI Patterns for Design Systems: Fast-Track Interaction Design for a Seamless User Experience. New York, NY: Springer Science. [ISBN: 978-1484249376]