

ECE 448 – Application Software Design

Credits: 3, **Contact Hours:** Two 75 minute lecture session per week.

Coordinator: J. Wang, Associate Professor of ECE

Textbook: E. R. Harold, *Java Network Programming*, 4th ed., O'Reilly Media, 2013.

2019 Catalog Data: ECE 448: Application Software Design. Credit 3.
 The course provides introduction to languages and environments for application software development utilizing Software as a Service (SaaS) for electrical and computer engineers. Languages addressed include Java, Python, SQL, and JavaScript. Key topics covered include systems development life cycle, client-server architectures, database integration, RESTful service, and data visualization. Programming projects will include the development of a data-rich web application with server back-end that connects mobile devices and Internet of Things using Agile software engineering practices. (3-0-3) (P)

Prerequisites or co-requisites by topic: ECE 242, senior standing.

Enrollment: Elective course for EE majors; computer systems/software elective course for CPE majors.

Specific outcomes of instruction:

After completing this course, the student should be able to do the following:

1. Understand application software architectures and application software development processes.
2. Utilize event-driven programming to support networking and graphical user interface in application software.
3. Design and implement testable class types. Document and validate functionality via unit testing.
4. Reuse existing class libraries to improve code quality and productivity.
5. Construct reusable class libraries using polymorphism.
6. Utilize design patterns when designing and reusing class libraries.
7. Be familiar with advanced topics including security, database, and data visualization.
8. Design and implement a networked application software with graphical user interface following test-driven and iterative/incremental software engineering practices.

Relationship of ECE 448 specific outcomes of instruction to student outcomes:

	Student Outcomes	Course Goals
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	1,2,3,4,5,6,7,8
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	2,3,4,5,6,7,8
3	An ability to communicate effectively with a range of audiences	
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	3,8
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

Topics:

- Introduction to application design (1 week)
- Java overview (1 week)
- TCP/IP networking (1 week)
- Socket programming (2 weeks)
- Observer and Pub/Sub patterns (1 week)
- The MQTT protocol (1 week)
- Object relationship and dependency injection (1 week)
- RESTful service (1 week)
- JavaScript and DOM (1 week)
- Web UI design (2 weeks)
- Security (1 week)
- Database integration (1 week)
- Data visualization (1 week)

Laboratory topics: **None**

Prepared by: J. Wang **Date:** February 28, 2020