

## ECE 448/528 – Application Software Design Spring 2021

**Instructor:** Professor Jia Wang (jwang34@iit.edu)

**Prerequisites:** Computer programming. If you haven't been writing programs for a while, please refer to the following book for introductory Java programming.

- “Head First Java”, 2nd Ed., K. Sierra et al., O'Reilly Media, 2005. 978-0596009205

**Class Home Page:** <http://www.ece.iit.edu/~jwang/ece448-2021s/>

Lectures will be streamed Mon./Wed. 11:25 AM – 12:40 PM or pre-recorded.

**Required Textbook:**

- “Java Network Programming”, 4th, E. R. Harold, O'Reilly Media, 2013. 978-1449357672

**Recommended Textbooks:**

- “Core Java Volume I–Fundamentals”, 10th or later, C. S. Horstmann, Prentice Hall.
- “Core Java Volume II–Advanced Features”, 10th or later, C. S. Horstmann, Prentice Hall.
- “Head First Design Patterns”, E. Freeman et al., O'Reilly Media, 2004. 978-0596007126

**Computer Requirement:** A computer desktop or laptop that is able to run VirtualBox is required for this course. Computers with solid-state drives, at least 16GB of memory, and at least 4 physical processor cores are recommended.

**Course Summary:** This course provides introduction to languages and environments for application software development utilizing Software as a Service (SaaS) for electrical and computer engineers. Student will develop a data-rich web application with server back-end that connects mobile devices and Internet of Things using Agile software engineering practices.

**Topics Covered:**

- The Java ecosystem.
- Client-server architectures and RESTful services.
- Pub/Sub middleware.
- Web user interface design.
- Security; database; data visualization.
- Software engineering and Agile development.

**ECE 448 Grading:** Homeworks 10% / Projects: 110% (20% extra).

A:  $\geq 90\%$  / B:  $\geq 80\%$  / C:  $\geq 60\%$  / D (undergraduate only):  $\geq 55\%$ .

**ECE 528 Grading:** Homeworks 10% / Projects: 95% (5% extra).

A:  $\geq 90\%$  / B:  $\geq 80\%$  / C:  $\geq 60\%$ .

**Homework and Project Policy:** Late homeworks and projects will not be graded. Homeworks will be graded based on general approach and completion. Discussions on homeworks/projects are encouraged, but copying will call for disciplinary action.

**Lecture Schedule (tentative):**

No.	Date	Topic	Chapters	HW Out	Project Due
1	1/18, 1/20	Introduction		HW #1	
2, 3	1/25, 1/27	Software Engineering and Java			
4, 5	2/1, 2/3	TCP/IP Networking	1,4-6		Project 1
6, 7	2/8, 2/10	TCP Server Design	3,8,9	HW #2	
8, 9	2/15, 2/17	HTTP			
10,11	2/22, 2/24	Observer and Pub/Sub			Project 2
12,13	3/1, 3/3	MQTT		HW #3	
14	3/8, 3/10	Web Application			
15,16	3/15, 3/17	Dependency Injection			Project 3
17,18	3/22, 3/24	RESTful Service		HW #4	
19,20	3/29, 3/31	JavaScript and DOM			
21,22	4/5, 4/7	Model-View-Controller (MVC)			Project 4
23,24	4/12, 4/14	Web UI Design		HW #5	
25,26	4/19, 4/21	Data Visualization			Project 5
27,28	4/26, 4/28	Database Integration			
29,30	5/3, 5/5	Security			Project 6
	5/10–5/14	<b>No Final Exam</b>			Project 7

**Course Objectives (ABET)**

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.

**ADA Statement:** Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me as soon as possible. The Center for Disability Resources is located in the Life Sciences Building, room 218, 312-567-5744 or [disabilities@iit.edu](mailto:disabilities@iit.edu).

**Sexual Harassment and Discrimination Information:** Illinois Tech prohibits all sexual harassment, sexual misconduct, and gender discrimination by any member of our community. This includes harassment among students, staff, or faculty. Sexual harassment of a student by a faculty member or sexual harassment of an employee by a supervisor is particularly serious. Such conduct may easily create an intimidating, hostile, or offensive environment. Illinois Tech encourages anyone experiencing sexual harassment or sexual misconduct to speak with the Office of Title IX Compliance for information on support options and the resolution process. You can report sexual harassment electronically at [iit.edu/incidentreport](http://iit.edu/incidentreport), which may be completed anonymously. You may additionally report by contacting the Title IX Coordinator, Virginia Foster at [foster@iit.edu](mailto:foster@iit.edu) or the Deputy Title IX Coordinator at [eespeland@iit.edu](mailto:eespeland@iit.edu). For confidential support, you may reach Illinois Tech's Confidential Advisor at (773) 907-1062. You can also contact a licensed practitioner in Illinois Tech's Student Health and Wellness Center at [student.health@iit.edu](mailto:student.health@iit.edu) or (312)567-7550 For a comprehensive list of resources regarding counseling services, medical assistance, legal assistance and visa and immigration services, you can visit the Office of Title IX Compliance website at <https://www.iit.edu/title-ix/resources>.

**COVID-19 Precautions and Face Coverings in Class:** Illinois Tech students are required to wear face masks at all times and maintain social distancing (6 feet between individuals) in traditional classrooms, instructional laboratories, and similar settings. In general, individuals should spend as little time as practicable in closer proximity when doing so is necessary to achieve learning objectives. Students who are feeling ill or experiencing symptoms such as sneezing, coughing, or a higher than normal temperature will be excused from class and are expected to stay at home. Instructors have the right to ask those who are not complying with these requirements to leave class in the interest of everyone's health and safety. In the event that a student refuses to comply with instructor directions regarding face masks and/or social distancing, the instructor has the right to ask the student to leave, and/or cancel class. A student who refuses to comply with these requirements will be referred to the Office of the Dean of Students for possible disciplinary action under the Student Code of Conduct. Additionally, as a reminder, following other simple practices such as frequent and thorough hand washing, wiping down desks and seats with disinfectant wipes when possible, not sharing personal items such as pens and cell phones, and avoiding crowded hallways and other enclosed spaces will promote good health in and out of the classroom. Visit [iit.edu/COVID-19](http://iit.edu/COVID-19) for details on Illinois Tech's response to coronavirus (COVID-19). For information from government authorities, please see the Centers for Disease Control and Prevention website at [cdc.gov](http://cdc.gov).