

## COURSE DESCRIPTION

<b>Department and Course Number</b>	CS491A	<b>Course Coordinator</b>	Chengyu Sun
<b>Course Title</b>	Software Design Laboratory	<b>Total Credits</b>	2

### Current Catalog Description:

Approaches to software design, including Design Patterns and other strategies for designing software systems. Each student will propose a substantial, individual software project, resulting in a preliminary report and project presentation.

### Textbook:

None.

### References:

- Fowler, Martin. *Refactoring: Improving the Design of Existing Code*, Addison Wesley Professional, 1999.
- McConnell, Steve. *Code Complete*, Microsoft Press, 1993.
- Gamma, Erich and Helm, Richard and Johnson, Ralph and Vlissides, John. *Design Patterns*, Addison Wesley Professionals, 1995.

### Course Goals:

This is the first part of a two-quarter software design lab, in which each student must develop a non-trivial, individual project under the supervision of the instructor. The goals of the course are

- To improve the ability of the students to undertake complex individual projects by guiding them through the early stages of a project development cycle, which include project proposal, requirement analysis, system design, and initial system implementation.
- To improve the oral communication skills of the students through two to three oral presentations.
- To improve the written communication skills of the students through the writing of a project proposal and a draft project report.

These course goals contribute to the success of **Student Learning Outcomes 1.a, 3, 4, 5, and 6**.

**Prerequisites by Topic:**

- Fluent in at least one programming language
- Data structures and algorithms
- Web-based programming
- Programming language paradigms
- Automata and Computation Theory

Students are also required to be in senior standing in order to take this course.

**Major Topics Covered in the Course:**

- Design patterns
- Architecture analysis
- Development tools
  1. Build
  2. Source Version Control
  3. Logging
  4. Documentation
- Emerging trends in software development
  1. Aspect-oriented Programming
  2. Attribute-oriented Programming
  3. Test-oriented Programming
  4. Agile Programming
  5. Extreme Programming
- Platforms and frameworks
  1. J2EE
  2. .NET

**Laboratory Projects (specify number of weeks on each):**

Each student works on an individually selected project for the entire course. The schedule of the project can be roughly outlined as follows:

- Week 1-2: Project proposal
- Week 3-4: Requirements analysis and design specification
- Week 5-6: Evaluation of existing tools and technologies
- Week 7-8: System design

- Week 9-10: Initial implementation

**Estimate Curriculum Category Content (Quarter Hours)**

Area	Core	Advanced	Area	Core	Advanced
Algorithms			Data Structures		
Software Design	2.0		Prog. Languages		
Comp. Arch.					

**Oral and Written Communications:**

Each student must give two to three presentations during the quarter, including a final presentation on the proposed project. Each presentation is 30 minutes long, and the audience may ask questions at any time during the presentation. The instructor grades all class presentations and gives feedback to the students.

Each student must also complete a written project proposal in the first part of the quarter and a draft project report at the end of the quarter. Both the proposal and the draft report are reviewed by the instructor, and feedback is provided to enable students to improve their written communication skills.

**Social and Ethical Issues:**

No significant component.

**Theoretical Content:**

No significant component.

**Problem Analysis:**

Students are required to identify the objectives of their projects, analyze the feature requirements, evaluate existing tools and technologies, estimate the workloads, and plan out a practical schedule for this course as well as for CS491B, in which they will complete the project.

**Solution Design:**

By the end of the course, students are required to complete the proposal, analysis, and design phase of the solution development process, and start initial implementation of their projects, which will continue in CS491B.