## SE 490 Senior Project I (3 units)

### Course Description

Group software engineering project requiring completion of a software system for an approved client. The students will work in teams on projects of interest to industry and will be involved in construction technologies, construction tools, project planning, software requirements elicitation and specification, analysis of requirements, cost estimation, risk analysis, use of standards, scheduling, prototyping, development of project management, configuration management, and quality assurance plans, project reviews and reports, architecture and design, documentation, team management and organization, copyright, liability, security, and handling project failure. The project will be completed in SE 491 in the following semester. *Prerequisites: SE 451*

### Course Materials

No textbook will be required for the course. However, in some sense, all the textbooks used in prior courses will be needed with supplemental materials being provided by the instructor when necessary.

### Learning Objectives

Students that successfully complete the course will be able to:

1. Identify, analyze, and apply skills and professional standards in computing essentials.
   - Learn construction technologies for software (e.g., assertions, design by contract, and defensive programming, error handling, exception handling, and fault tolerance, state-based and table-driven construction techniques, runtime configuration and internationalization, grammar-based input processing, concurrency primitives, construction methods for distributed software, constructing hardware/software systems, performance analysis and tuning, etc.)
   - Learn construction tools for software (e.g., user interface frameworks and tools, unit testing tools, profiling and performance analysis tools, etc.)
   - Learn professionalism regarding software (e.g., accreditation, certification, and licensing, codes of ethics and professional conduct, social, legal, historical, and professional issues and concerns, the nature and role of professional societies, the nature and role of software engineering standards, the economic impact of software, employment contracts, etc.)
2. Identify, analyze, and apply skills and professional standards in mathematical and engineering fundamentals.
   - Apply engineering economics for software (e.g. value considerations throughout the software life cycle, evaluating cost-effective solutions, etc.)
3. Identify, analyze, and apply skills and professional standards in software process.
   - Learn software configuration management such as maintenance issues, distribution and backup
   - Learn evolution process and activities for software such as refactoring
4. Identify, analyze, and apply skills and professional standards in security issues for software.
   - Learn protection and defense mechanisms and tools for software in computer and network security
   - Learn techniques of developing and constructing secure software

**Course Structure**
The course is the first of the course sequence as a culminating project experience for students. Students will learn by doing many subjects in software process and professional practice including construction technologies, construction tools, project planning, software requirements elicitation and specification, analysis of requirements, cost estimation, risk analysis, use of standards, scheduling, prototyping, development of project management, configuration management, and quality assurance plans, project reviews and reports, architecture and design, documentation, team management and organization, copyright, liability, security, and handling project failure.

**What is the format of the course?**
Projects of interest to industry will be solicited from surrounding community beforehand. The course is offered as a sequence of 3 hours of discussion per week. There is some lecture, but this is not a dominant part of discussion and experience.

**How are students assessed?**
*Homework Assignments* – The homework assignments consist of documentation of the steps in a software project. The student will submit written assignments that demonstrate the stages of the nproject: planning and management, requirements elicitation and specification, analysis of requirement, and construction.

*Oral presentation* - Each team will provide an oral presentation to share their approach in the project. The presentation will focus on planning and management, requirements elicitation and specification, analysis of requirements, construction, and documentation.

*Project* - Each student will be part of a team to work on a full-year senior project. The students will formally document their project, including the contributions from the team members.

**Grade Distribution**

| Homeworks | Oral presentation | Project |
|---|---|---|
| 40% | 20% | 40% |

SCALE:
A, 93 or more; A-, at least 90 but less than 93;
B+, at least 87 but less than 90; B, at least 83 but less than 87; B-, at least 80 but less than 83;
C+, at least 77 but less than 80; C, at least 70 but less than 77;
D, at least 60 but less than 70
F, 0 to less than 60

Course Policies

*Campus Writing Requirement*
The University Writing Requirement of 2,500 words in this course will be exceeded by solving the problems on your homework and by the documentation in your project.

*Inform Your Instructor of Any Accommodations Needed*
Students with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS). This office is located in Craven Hall 4300, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with me to ensure accommodations are met.

*Cougar Care Network (CCN)*
Our campus has implemented a new early alert system to support and promote students' academic and personal success. I may refer you through the Cougar Care Network (CCN) to get connected to campus support and resources to assist you.

*Civility Campaign*
The Civility Campaign, an effort led by the Dean of Students Office, defines civility to reflect the community values of CSUSM. The university strives to be a community demonstrating respect for oneself and for others, treatment of others with dignity, and behaviors which promote a physically and psychologically safe, secure and supportive climate enabling all community members to engage as full and active participants where the free flow of ideas are encouraged and affirmed.

## COURSE TOPICS for SE 490

This course is the culmination of the courses you have taken. You will apply the concepts and techniques to develop, implement, and manage a project within the constraints of a project. Your project will include planning, implementation, and documentation of all aspects of a software project:

- Goals of the project (e.g., functional goals, strategic goals, business goals, technology goals, quality goals, other goals such usability, portability)
- Scope of the project (e.g., constraints, deliverables, priorities, )
- Organization boundaries and interface (e.g., stakeholders, organizational and client contacts)
- Project organization (identify manager, list project team and steering committee; identify roles and responsibilities for attributes such as quality assurance, testing, configuration management, change management, etc)
- Schedule and budget (e.g., estimate and document the effort for the project activities and plan the activity sequencing; prepare the schedule that supports all of the required activities; define project milestones; list critical events in the schedule; form clear measurements for milestones; create and maintain a budget for the project, including human resources, purchases, equipment, supplies, tools, travel, training, …)
- Describe and document the stages of software development as the pertain to your project: requirements/specification elicitation, software design and architecture, change and configurement management, validation and verification, testing, security, documentation, quality assurance, user interface, reviews and audit, problem resolution, milestones, deliverables, …)
- Describe the development process of the project (e.g., select and explain why the development process was selected, how the process is tailored to the project; determine methods, tools, and programming languages to be employed for design)
- Describe how measurements will be used to assess the achievement of the project goals

- Describe the procedure used for managing risks in the project (including the documentation, assessment, responsibility, and prioritization of risks)
- State the principles for reporting and distributing information within the project for the different groups of internal and external stakeholders (including how often the reporting occurs, the type of reports, the type of media, the type of meetings which would occur, the communication of milestones)
- List all deliverables from the project and the receivers of the deliverables, as well as the planned delivery dates
- Document the quality assurance plan
- Document configuration and change management
- State how to deal with security aspects (e.g., integrity and confidentiality, organizational security requirements, authorization of information distribution and publishing, procedure for monitoring security and reporting incidents)