CptS 322: Software Engineering Principles I

Spring 2020

Meeting time: Tuesday, Thursday, 14:50 – 16:05, Jan 13 – May 1

Location: Carpenter Hall 102 (Pullman campus)
Course webpage: http://www.eecs.wsu.edu/~hcai/cpts322

Instructor: Haipeng Cai
Office location: EME B47
Email: haipeng.cai@wsu.edu
Office hours: Tuesday, Thursday, 16:15pm – 17:15pm, or by appointments

Teaching Assistant: Wen Li
Office location: Sloan Hall 316
Email: li.wen@wsu.edu
Office hours: Monday, Wednesday, 16:00pm – 17:00pm or by appointments

---

Course Description

Software engineering is a subject that concerns the holistic process of software development, distilling the common principles for constructing and maintaining quality software products independent of particular programming languages used. The core of this subject is characteristics of a lifecycle model that covers different phases of software development process, including requirement analysis, software design, implementation, testing and validation, evolution and maintenance. Beyond an introduction to the holistic software process at first, this course will mainly focus on the first two phases, requirement analysis and design, covering object-oriented and functional paradigms.

Course Content Overview

The core content is the generic software process and concrete software process models, requirement engineering and various analysis model elements, design engineering and various design model elements, and introduction to quality assurance, software testing and software project management. Students will also learn valuable skills necessary for software engineering practices, including using a version control system, creating project plan, soliciting requirements, creating design models, and practicing validation and verification activities. Students will participate in a semester

long group project to gain hands-on experience applying software engineering principles and techniques.

Course Learning Objectives

This course will help students achieve the following objectives:

- Understand software process including the generic process framework and common instances of the framework (classical and modern process models).
- Understand key concepts on requirements engineering, design engineering, quality assurance, risk control, and software project management.
- Gain skills in eliciting and modeling software requirements, describing different elements (use cases, data/control flow, analysis classes, and system behaviors) of a requirements model using UML.
- Gain skills in deriving software design, describing various design models (data objects, user interface, components, architecture, deployment) using UML.
- Develop a basic understanding of software testing strategies and the preliminary skill in writing test cases.

Prerequisites

Students taking this course are expected to have already taken CptS 222 or CptS 223 with a grade C or better (NO concurrent enrollment). Through these prerequisite courses, students should have gained a solid background in data structures and object-oriented programming (C/C++ or Java).

Textbook

[SEPA] R. Pressman, *Software Engineering: A Practitioner's Approach, 7th edition*, McGraw-Hill. 2009. ISBN-10: 0073375977. (newer editions are good too.)

Supplemental Texts

[MMM] Frederick P. Brooks, *The Mythical Man-Month: Essays on Software Engineering*, Anniversary Edition. Addison-Wesley Professional. ISBN-10: 0201835959.

[ISSE] Ian Sommerville, *Software Engineering, 9th edition*, Addison-Wesley. ISBN-10: 0137035152.

Content Outline and Lecture Schedule (Tentative, weekly)

Week / dates	Topics	Readings	Evaluations/Submissions
W1	Syllabus, introduction to SE, course project, software process framework	pp. 3-24 Project documents	Project milestone 0 Homework 1

W2	Introduction to software version control and process framework	Git basics pp. 30-42	
W3	Software process models, agile process	pp. 43-90	Project milestone 1
W4	Requirements engineering	pp. 119-145 pp. 841-859	Homework 2
W5	Requirements modeling: scenario-based elements	pp. 148-164 pp. 847-848	Project milestone 2
W6	Requirements modeling: class-based elements	pp. 164-173 pp. 842-857 pp. 863-870	Project milestone 3 Homework 3
W7	Midterm review		Midterm exam (Feb 27, Thursday: 2:50-4:05 pm)
W8	Requirements modeling: flow-oriented elements	pp. 173-194	
W9	Requirements modeling: behavioral elements	pp. 195-205 pp. 848-853	Project milestone 6 (early stage)
W10	Spring vacation		
W11	Design engineering, design modeling	pp. 215-264	Project milestone 4 Homework 4
W12	Design modeling	pp. 265-273	
W13	Design modeling	pp. 276-335	Project milestone 5 Homework 5
W14	Quality management	pp. 398-446	Project milestone 6 Project milestone 7
W15	Software testing	pp. 449-662	Project milestone 8
W16	Final exam review Project presentation		
W17			Final exam (May 4,Monday: 10:10 am - 12:10 pm)

Grading

The final course grade will be calculated using the following breakdown and be converted from numeric numbers to letter grades using the scale mapping as follows. In addition to these basic components of grade, extra/bonus points may be earned through quizzes and *extended* class participation. Ways of extended class participation include

in-class discussion and office-hour attendance. It is at the instructor's discretion to calculate the extra/bonus points by the end of the semester.

Breakdown *Scale mapping*

Participation	5%		Score	*Grade*	Score	*Grade*	Score	*Grade*
Homework	15%		>=93	*A*	[80,83)	*B-*	[66,70)	*D+*
Project	50%		[90,93)	*A-*	[77,80)	*C+*	[60,66)	*D*
Midterm exam	15%		[87,90)	*B+*	[73,77)	*C*	<60	*F*
Final exam	15%		[83,87)	*B*	[70,73)	*C-*		

Communication

We will communicate announcements, assignments, lecture materials and other learning resources all on Blackboard. In particular, we will host off-class Q&A through the Discussion Board on Blackboard. Blackboard is also the portal to be used for project deliverables and homework assignments submission and grading. For questions on course materials, lectures, and course project milestones, contact the instructor/TA on the Discussion Board by sending posts instead of by emails, so as to facilitate communication management. You have options for sending *private (anonymous)* posts. Make sure you **subscribe** each of the forums there so that you won't be missing important information about the course logistics and extended lecture discussions initiated by questions raised by other students.

Participation

Class attendance is required at all lectures. Although supplementary slides and assigned readings will be posted online, these materials as well as the recommended textbooks are only used as references by the instructor in developing the lectures. Thus, studying these materials and textbooks serves the purpose of getting better prepared for attending in-class lectures, but would by no means substitute for class attendance. Also, the course project requires each team member to be responsible and collaborative as well as to contribute equally; thus, missing lectures without justifiable reasons and then relying on other team members to catch up missed topics is not acceptable. You are also expected to participate in class discussions, which aids learning and provides valuable feedback on the lecture. Lectures will be delivered mainly through whiteboard. It is the students' responsibility to take their own notes during lectures.

If you know you will miss a lecture for a justifiable reason such as a university activity, religious holiday, military service, or a medical appointment, notify the instructor by email or phone call at least 12 hours before the lecture. If you are participating in a university activity the supervisor of the activity should provide you with documentation. Others should provide a written explanation in their own words by email -- documentation from medical personnel is NOT required but you must document the absence. If you are unexpectedly sick or otherwise unable to attend due to an emergency, contact the instructor as soon as possible. If you miss a class for these justifiable reasons, arrange with a fellow student to get and digest the corresponding notes, and go to the instructor's office hours for further help if needed.

While attendance will not be taken in every class, it will be sampled randomly at the discretion of the instructor. The basic participation credit that accounts for 5% of the final grade will be calculated using the sampled attendance records. If you attend 80% of the sampled lectures, you will receive the basic participation credit in full. Bonus points will be given to students attending more than 80% of sampled lectures.

In addition, students are expected to maintain a professional and respectful classroom environment, for which students are suggested to:

- silence personal electronics (non-disruptive ones may be used during class)
- arrive on time and attend the entire class session

Homework and Project

Homework assignments usually require 1-2 weeks to complete. These assignments with respective due dates will be announced in class and posted on Blackboard. You are encouraged to take advantage of office hours offered by both the instructor and TA if you have questions for homework/project assignments.

The progress of a semester-long group project will be measured by milestones. The objectives, requirements, and due date of each milestone will be communicated the same way the homework assignments are managed. For each milestone, your group will be required to submit a written report, code, and/or test cases to demonstrate project progress. Each member of the group will initially receive the same credit based on the quality and timeliness of group submissions, and will be later adjusted according to in-group peer evaluation by the end of the project.

Unless specified otherwise, each homework or project milestone shall be created and submitted electronically *as a single PDF* on Blackboard prior to the deadline which is 11:59 pm of the posted due date.

Late submission policy

NO late homework or project milestone submissions will be accepted unless the instructor grants an extension upon request by individual students/groups via email at least 24 hours before the deadline.

If an extension is granted, the penalty of a late submission is 2% point deduction for every day after the original deadline. The instructor may allow for late submissions without penalty if extenuating cases are explained in the notice email sent to the instructor.

Note that by the end of the semester, it is the university's policy that missing any homework or project milestone submission without prior notice and extension approval will lead to *an "I" (incomplete) grade* for the responsible students---that means an I grade for this course, NOT just for the associated assignment. So if you submit an assignment late without notice/approval, you may just receive a zero grade for that assignment alone, but if you miss an assignment in the end you will get an 'I' grade for the course as a whole (that is what the grade means: the student does not complete the coursework!). Students missing an exam by the end of the semester will also receive an 'I' grade for this course.

Academic integrity / Honor code

The fundamental requirement for all student work in this class is: Unless otherwise explicitly permitted by the instructor, all work you turn in must be your own. Any instance of academic dishonesty, as defined in the WSU Student Handbook, in this class will be dealt with severely (typically by failing the class) and reported to the WSU Office of Student Conduct.

Note in particular that it is dishonest not only to copy another student's work, but to permit another student to copy yours. Nevertheless, realizing that students can assist each other in understanding general course material, there are limited ways in which student collaboration is permitted:

1) You may communicate verbally with another student, as long as you do not communicate the answer or the content of what you are going to turn in, whether it be code or text. A good way to work in this regard is for the student providing help to ask guiding questions of the student needing help, letting them arrive at the answer themselves.
2) You may draw diagrams and such on a whiteboard, chalkboard, or piece of blank paper to illustrate the verbal points made in 1), as long as you do not write what you are going to turn in.

It will be up to the discretion of the grader (if applicable) and instructor to determine if any assignment shows evidence of collaboration beyond these limits. Any attempt to circumvent the spirit of these rules will be treated as a violation of the fundamental requirement. If you are in doubt, do not give help to or request it from another student: That's what office hours are set for. Information on WSU Academic Integrity can be found at www.academicintegrity.wsu.edu/ and conduct.wsu.edu/, and the WSU Honor code is on https://provost.wsu.edu/tag/wsu-honor-code/. Please also read the EECS Academic Integrity Policy carefully. Use these resources to ensure that you do not inadvertently violate WSU's standard of conduct.

Accommodations

Reasonable accommodations are available for students who have a documented disability. Classroom accommodation forms are available through the Access Center (Washington Building 217; 509-335-3417). If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center. For more information, consult the webpage http://accesscenter.wsu.edu or email at Access.Center@wsu.edu.

Safety information

The Campus Safety Plan (http://safetyplan.wsu.edu) contains a comprehensive listing of university policies, procedures, statistics, and information relating to campus safety. The University emergency management website (http://oem.wsu.edu/) provides campus safety and emergency information. The emergency alternative site (http://alert.wsu.edu) provides information about emergencies and communication resources WSU will use to provide warning and notification during emergencies.

Classroom safety is also of paramount importance at Washington State University, and is the shared responsibility of the entire campus population. WSU urges students to follow the "Alert, Assess, Act" protocol for all types of emergencies and the "Run, Hide, Fight" response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and act in the most appropriate way to assure your own safety (and the safety of others if you are able). Please sign up for emergency alerts on your account at MyWSU.