

CPE 405 Software Construction Winter 2010

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Course Description

This is the second in a three-course (academic year long) sequence. It is generally assumed that the student plans to take all three courses in the sequence in one year. The primary objective of the year-long sequence is to develop a software system for an outside customer. The primary outcome of this course is to work with a customer in teams to construct a software architecture and software product that fulfills customer requirements.

The catalog describes this course as follows:

Design and construction of sizeable software products. Technical management of software development teams. Software development process models, software design, documentation, quality assurance during development, software unit and integration testing; CASE tools, development environments, test tools, configuration management.

Objectives

- To learn skills required to produce and maintain a high-quality software product on time and within budget
- To know and execute principles and concepts of software construction
- To know and execute principles and concepts of software architecture
- To work effectively as a member of a team to meet project milestones
- To understand and apply a software process
- To understand and apply software metrics
- To effectively write and speak about software engineering

Prerequisites

CSC/CPE 402

Required Texts

1. DeMarco, Lister, Peopleware; Productive Projects and Teams, 2nd Edition, Dorset House, 1999
2. Hunt, Thomas, The Pragmatic Programmer, Addison-Wesley, 2000
3. Gold Fibre Design: Project Planner Notebook No. 20-817 to be used for your status reports

Additional Reading

Periodically, additional articles will be passed out or assigned for you to find and read.

Schedule

This course will meet Monday, Wednesday, and Friday from 10:10am to noon in 14-256. Students are expected to attend all course meetings.

Typically the first hour will include instructor and student presentations and discussions. The second hour will usually be spent on project activities, some prescribed and some delegated to team discretion. Fridays will generally include a remote or face-to-face meeting with the project customer.

A tentative schedule of topics and activities is attached. This schedule is subject and likely to change. All reading assignments should be completed prior to class as noted in the schedule.

Furlough Days

All CSU faculty are required to take six furlough days each quarter during the 2009-2010 academic year. As a result, Dr. Janzen will not be available on the following days: January 19 and 29, February 8 and 16, and March 1 and 9. Class activities may still be planned even on days when Dr. Janzen is not in attendance due to the required furloughs.

Communication

The best place to discuss the course is during lecture and laboratory times. The main communication tool for the class will be the course schedule and a wiki. Students will be expected to check both on a daily basis. Posts to the wiki should never criticize people. Constructive criticism of artifacts and ideas is acceptable. All assignments will be placed on the course web site and/or announced in lecture. Most class materials are available on the course web site; be sure to check regularly.

Email will only be used for special circumstances, such as communicating time sensitive information or personal issues. All students are expected to have their calpoly.edu email accounts forward to wherever they will read email at least daily. If you use email, put CSC 405 on the subject line to get the best response time. Leaving phone voicemails should be a last resort.

Classroom Etiquette

To ensure a professional learning environment, the following rules will be enforced in the classroom:

- Do not eat except when food is provided for the entire class
- Do not use electronic devices that make sounds (e.g. cell phones, ipods)
- Do not use computers for anything besides presenting or taking notes when anyone is presenting

Grading

The course grade will be determined on the following factors:

1. Examinations (10%)
2. Attendance and Participation (10%)
3. Individual Assignments (30%)
4. Team Project Artifacts and Presentations (50%)

Letter grades will be assigned based on the expectation that an 'A' is earned with excellent work on all aspects of the course, sustained throughout the course. A 'B' is earned with very good work, perhaps excellent at times. A 'C' is earned with average work, perhaps very good at times but poor at other times. A 'D' is earned with consistently poor work.

Examinations

A written final exam will be given on March 17 from 10:10am to 1pm that is worth 10% of the final grade. No early, late or makeup exam will be given except in an extreme circumstance (e.g. severe illness).

Classroom Attendance and Participation

Students are expected to take an active role in their own learning and the learning of their peers. Students will receive 1% credit for each week of acceptable participation. Acceptable participation is earned by attending, arriving on-time, participating in discussions and activities, and being prepared for all lecture and lab sessions, including reading all assigned sections prior to class. Students should make it a habit of adding meaningfully to discussions and asking relevant questions without dominating discussions. Up to three absences will be acceptable provided the student provides a valid reason, notifies the instructor by email, and receives an acknowledgement prior to class. More than three absences, for whatever reason, will result in a zero for the course participation grade.

Individual Assignments/Presentations:

Quizzes (10%)
Iteration Task Time (2%)
Weekly Journal (5%)
Design Pattern Presentation (2%)
Metric Summary (2%)
Artifact Review (2%)
Code/Test (2%)
Leadership Role/Plans/Goals (1%)
Self/Peer Evaluations (4%)

Quizzes

Quizzes will be given which will test comprehension of readings and recent presentations and discussion topics. Some or all of the quizzes will be given in Blackboard prior to class.

Iteration Task Time

Students must track the time they spend on the group project. Each team may select a tool (e.g. Rally) for tracking tasks, and estimated/actual time. Students must enter all tasks, time estimates, and actual times for each iteration. At the end of each iteration, a detailed report should be printed to a pdf and posted on each team's wiki by 10:10am on the Wednesday following completion of the iteration. Task/time entries will be graded pass/fail.

Individual Journal

Each student must keep a course journal and bring the journal to every class meeting; it can be collected and graded at any time. Every entry in the notebook must be dated and clearly labeled and should follow the template provided. The journal must contain, at a minimum:

- Your name and team logo on the notebook cover
- Weekly entries including:
 - Log of time spent on the course / project (optional)
 - List of assigned action items
 - Notes on action item activities
 - Personal and group problems encountered
 - Personal notes on readings, interviews, research, team meetings, and anything else of project interest
 - Reflections on the course project and software engineering concepts

Weekly journal entries are due on Mondays at 10:10am for the previous week (Sunday through Saturday), and will be assigned a grade of 0 (inadequate), 1 (adequate), or 2 (excellent).

Design Pattern Presentations:

Students must give one short (5 to 7 minute) presentation in class on a design pattern. Students must select a topic and date by January 13. Students are to speak without notes, although strategic visual aids may be used. Presentations will be graded subjectively both on the quality of the content and the effectiveness of the communication. Presentation resources must be posted to the course wiki within two days of giving the presentation.

Metric Summary:

Each student should become an expert on one software metric. Students should post to the course wiki a detailed summary of the metric including how to calculate the metric with an example, what its values mean or are used for, and tools that calculate the metric. Students will also give a very brief (2 to 3 minute) summary presentation on the metric in class. Students must select a metric and date by January 13. The posting should be completed prior to giving the presentation.

Artifact Reviews:

Although many reviews of individual project artifacts will occur throughout the course, each student is expected to prepare at least one significant artifact for formal review during a Friday review with our industry customer. Example artifacts include code, tests, user interfaces, or diagrams. Items should be posted on the course wiki at least by Thursday at 8am prior to the scheduled review. Students should create a page on their team wiki that describes and links to the original artifact as reviewed, minutes from the review, action items resulting from the review, and resolution of action items. This page should be clearly labeled with your name and is due March 8.

Code/Test:

Each student is expected to participate in hands-on software construction activities in the course project. To help achieve this goal, students should 1) demonstrate that they have a working development environment during lab on January 13, and 2) accept a task that involves direct source code and unit test development. The code/test should be non-trivial. Students should create a page on their team wiki that describes and links to one set of source and unit test code for which they

were the primary author (maximum of one file each). This page should be clearly labeled with your name and is due March 8.

Leadership Role/Plan/Goals:

Each student should take a leadership role in their team project. This role should be identified along with plans and goals for how the role will be fulfilled. These items should be written in the project journal by January 13.

Self/Peer Evaluations:

Each student will complete two self/peer evaluations due in class on February 10 and March 17. As part of the final evaluation, students should create a page on their team wiki that details their individual contributions to the project. The page should identify any particular roles the individual fulfilled (e.g. recorder, team lead, quality assurance), and when they fulfilled that role (e.g. all quarter, weeks 3-5). The page should also identify all significant contributions to artifacts (feel free to link to the artifact). Identify what role you took on the artifact (e.g. author, editor, reviewer). Finally, any significant tasks completed on the course project should be identified.

Group Project

All of the work in CSC405 is connected to a three term (one year) project. You will work in a group to carry out each phase of the project. The project itself will have to meet standards of the instructor and the customer. The project is the cornerstone of this course and is the largest basis of your course grade. Teams of approximately five members will be formed early in the course. Team members will be internally managed to deliver a number of project artifacts. Most significantly the teams will produce a working software product that meets the requirements specifications. Additionally, teams will conduct regular reviews of artifacts, and collect and publish metrics. The team will present the working system and metrics to the class. Each member of the team should assume some leadership role. Teams are expected to meet in person outside of class at least once per week.

The project evaluation is done as if you were a corporate employee. The project grade is assigned subjectively on an individual basis. Criteria used in determining the project grade will include action item acceptance and timely completion, quality of artifacts, self and possibly peer evaluations, perceived leadership and teamwork skills, and quality of presentations. ***Coat-tail hanging or non-performance by an individual will result in a course grade of F. You are required to participate fully in your group project.*** You must perform as part of a team. This is paramount.

The following is a general guideline used in determining the individual grades on the group project:

- A: volunteered for and completed significant tasks in every iteration, demonstrated strong leadership on at least two significant team deliverables, worked effectively with teammates and customer, received high praise from teammates in self/peer evaluation
- B: volunteered for and completed tasks in every iteration, many of which were significant, demonstrated leadership on at least one significant team deliverable, worked effectively with teammates and customer, received praise from teammates in self/peer evaluation
- C: volunteered for and completed tasks in every iteration, worked effectively with teammates and customer, received praise from teammates in self/peer evaluation, or at least no significant complaints

- D: volunteered for and completed tasks in some, but not all iterations, worked with teammates and customer, although perhaps communicated poorly or was unreliable, received significant complaints from teammates in self/peer evaluation
- F: failure to participate consistently on the team project

Team Website

Each team must maintain a project website that is kept up-to-date on a weekly basis. The team website will consist of the team's Trac wiki and Rally (or similar) account, and must contain the current version of all significant project artifacts including, at a minimum:

- Your team name, team logo, and team member names and contact information
- Lists of iterations, user stories, assigned action items, estimate times, and actual times for the entire team
- Project artifacts such as source code, tests, configuration files, metrics, designs, requirements traceability matrix, and deployment plan

Late Work Policies

A software engineer has a responsibility to manage time effectively and turn in work on time. Most deadlines are rarely absolute; if you are having a problem, discuss it; this advice applies to the workplace as well as any college class.

For CSC 405, the following nominal late policies apply:

- **Individual Assignments**
Homework assignments are due at 9:10am on the date specified. Late journals, timesheets, or homework assignments will be given a maximum of half credit and accepted only until the next class period following their due date.
- **Project deadlines**
Project deliverables must be turned in on time, even if incomplete. If a significant part of a deliverable is missing or unacceptable, the individual(s) responsible will be penalized 3 grades (e.g. A to B). Unacceptable deliverables may be resubmitted, without penalty, up to one week later. Failure to resubmit work or subsequent resubmittals will be penalized one grade per week or partial week.
Note: depending on circumstances, project deliverable penalties are assessed on an individual or group basis. If your group has a non-performer, turn in your deliverables on-time with an accurate credits section. The identity of the non-performer will be crystal clear.

Integrity

All work submitted is to be your own. Cooperative study and mutual aid are healthy learning methods and are strongly encouraged. You are especially encouraged to work with other groups. Just cite sources of anything you have copied, summarized or discussed directly with another. It is cheating to copy someone's work or allow someone to copy your work. It is cheating to copy material from a publication without giving credit. Plagiarism will result in a course grade of F. When you find good ideas by other people, the best policy is to summarize other work in your own words and cite their work as the source for the principle you state. Citing resources is not a sign of weakness of your own ideas, it is a sign that you can do research and build on others' work.