CPE 405 Software Construction
Winter 2013

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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

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 2:10 to 4pm in 14-255. 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.

Communication
The best place to discuss the course is during lecture and laboratory times. The main communication tools for the class will be the course schedule, a Piazza discussion group, and PolyLearn. Students will be expected to check the first two on a daily basis. Posts to Piazza 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. Grades will be posted in PolyLearn.

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 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 22 from 1 to 4pm that is worth 10% of the final grade. No late or makeup exam will be given.

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%)
Presentation (5%)
Task Time Tracking (2%)
Weekly Status Updates (5%)
Artifact Review (2%)
Metric Summary (2%)
Code/Test (2%)
Self/Peer Evaluations (2%)

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

> **Individual Presentations:**
> Students must give one short (5 to 7 minute) presentation in class on a design pattern. Students must select a topic/date by the second Monday in the course. 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.

> **Task Time Tracking**
> Students must track the time they spend on the group project in JIRA. Students must enter all tasks, time estimates, and actual times. Entries should be up to date by 10am each week. At the end of each iteration, a detailed report should be printed to a pdf and posted on the course Google Doc by 10am on the Monday following completion of the iteration. Task/time entries will be graded pass/fail.

Weekly Status Updates
Each student must submit a brief weekly status update to Dr. Janzen. The update is an opportunity to share individual accomplishments and challenges on the course project. The update will be submitted through a web form and is due by 10am every Monday. The updates will be graded pass/fail.

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 Google Doc at least by Wednesday at noon prior to the scheduled review. Students should post a pdf of the original artifact as reviewed, the modified artifact after the action items are complete, minutes from the review, action items resulting from the review, and resolution of action items. These items should be printed and handed in by the last day of week 10.

Metrics:
Each student should become an expert on one software metric. Students should post to the course Google Doc a detailed summary of the metric including how to calculate the metric with an example, what its values mean or are used for, tools that calculate the metric. The posting should be complete by the end of week 7.

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 accept at least one task that involves direct source code and unit test development. The code/test should be non-trivial. Students should turn in a printed listing of their source and unit test code that is not more than four pages total. This listing should be clearly labeled with your name and is due in class by the end of week 9.

Self/Peer Evaluations:
Each student will complete a self/peer evaluation. As part of the final evaluation, students should create a page on the course Google Doc 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. 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.

Team 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.

Teams will conduct regular reviews of artifacts, and collect and publish metrics. The team will present the working system and metrics to the class. An initial set of calculated metrics should be posted by the end of week 6, and final metrics should be posted by the end of week 10.

The team iteration schedule may be negotiated with your industry customer. Iterations should last a minimum of one week and a maximum of two weeks. In weeks when an iteration is not due, teams are expected to use some or all of their customer meeting to conduct formal artifact reviews. At the end of each iteration, teams should post an iteration report detailing the features attempted, features completed, acceptance tests, and JIRA task/time report. The report should be posted by 10am on the Monday following the iteration end.

Each member of the team should assume some leadership role (e.g. project manager, quality assurance, build manager, security, HCI). Although students are all expected to take and complete a variety of tasks, their leadership role encompasses a dimension of the project for which they take particular responsibility, provide direction and perform reviews for the entire team. The leadership role should be identified in the first weekly status update.

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. Each student is expected to develop and present code in a formal review. ***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.

Each project deliverable must be completed in a professional way. Work may be returned until it reaches a professional standard. If substandard work is turned in toward the end of the quarter, all group members will earn a course grade of F.

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 the beginning of class on the date specified. Late status updates, time entries, 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.