COMP 4081: Software Engineering
Spring 2019

Monday, Wednesday 2:20–3:45 p.m.
FedEx Institute of Technology 226

https://memphis-cs.github.io/comp-4081/

Please send all emails to this address:
comp4081-instructors@googlegroups.com

Instructor: Dr. Scott Fleming <Scott.Fleming@memphis.edu>
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Office Location: Dunn Hall 303

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Consulting Hours: By appointment

1 Catalog Description

COMP 4081 - Software Engineering (3)
Scope of software engineering; software life cycle models; software process; team organization; requirements analysis and design methodologies; metrics, inspections, testing strategies and maintenance; software risks; professional and ethical responsibilities. Computer Science majors should plan to take COMP 4882 during the following spring semester. It is recommended that students take COMP 3115 before taking this course. PREREQUISITE: COMP 2150, permission of instructor.

2 Why This Course?

This course provides students with a foundation in software engineering by covering commonly used process models and the steps associated with these models. Students work in teams to develop a medium-sized software system using recommended practices. Upon completion of this course, students will be prepared to develop software systems in an industrial setting or to continue graduate study in software engineering.

3 Course Outcomes

1. Use modern software development tools (e.g., Git) to perform effective configuration management.
2. Design and model software using modern modeling languages and notations (e.g., UML). [SO6]
3. Convey ideas orally through presentations to peers, clients, and faculty.
4. Gather and specify software requirements (e.g., as user stories).
5. Apply a modern software engineering process (e.g., Scrum) to the development of a software project.
6. Produce high-quality software-development artifacts for each phase of the development cycle.
7. Apply modern software testing tools and techniques (e.g., black- and white-box testing).

8. Develop software in collaborative teams.
9. Plan work and to distribute tasks among team members to maximize team productivity.

4   Topics

The course will emphasize the following topics (a subset of the knowledge areas in the *Guide to the Software Engineering Body of Knowledge*[1]):

- Software Requirements
    - … including elicitation, specification, and validation

- Software Analysis & Design
    - … including principles, methods, patterns, architecture, and notations

- Software Testing
    - … including levels, techniques, and measures

- Software Configuration Management
    - … including version control

- Software Project Management
    - … including estimation, planning

- Software Engineering Process
    - … including life-cycle models, assessment and improvement

5   Required Equipment

Students will be required to bring a laptop to all lectures.

System Requirements: Capable of running Linux virtual machine (VirtualBox). (Hardware must support virtualization.)

6   Suggested (but Not Required) Textbooks

- *Head First Software Development* by Pilone & Miles, O'Reilly Media, 2008.
  http://amzn.com/0596527357, http://shop.oreilly.com/product/9780596527358.do
    - This book supplements the lecture material well.

- *Software Engineering: Theory and Practice* by Pfleeger & Atlee, Prentice Hall, 2009.
  http://amzn.com/0136061699
    - Pretty typical software engineering textbook; serves best as a reference.

- *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development* by Larman, Prentice Hall, 2004.
  http://amzn.com/0131489062
    - Detailed, practical coverage of software analysis and design principles, methods, and patterns; a bit overly obsessed with the minutia of Rational Unified Process.

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[1] http://www.computer.org/portal/web/swebok

- *Head First Design Patterns* by Freeman and Freeman, O'Reilly, 2004.
  http://amzn.com/0596007124 | http://shop.oreilly.com/product/9780596007126.do
    - Geared toward learners; covers practical aspects of applying software design patterns.

Table 1. Grading scale.

A+	≥ 97%
A	91–96%
A−	89–90%
B+	87–88%
B	81–86%
B−	79–80%
C+	77–78%
C	71–76%
C−	69–70%
D+	67–68%
D	60–66%
F	≤ 59%

7 Evaluation

Grading weights are as follows:

- 40% Team Project
    - 21% Team Achievement
        - 5% Milestone 0 (Initial Planning)
        - 4% Milestone 1
        - 4% Milestone 2
        - 8% Final-Product Evaluation
    - 19% Individual Productivity
        - 7% Milestone 1 Regular Productivity
        - 7% Milestone 2 Regular Productivity
        - 5% Above and Beyond Productivity
- 36% Exams
    - 18% Exam 1
    - 18% Exam 2
- 14% Homework and Quizzes (weighted by point value)
- 10% Participation

To convert from percentages to letter grades, see Table 1. I reserve the right to *lower* the percentage threshold for letter grades as I see fit (i.e., I may make the grading scale better for you, but never worse).

7.1 Team Project

The centerpiece of this course is a team software project. Teams of roughly 4 students will work together to develop a software system for a customer.

I reserve the right to assign the teams, and to reshuffle them as I see fit.

Team projects in an educational setting must balance two concerns: (1) the need for students to work together as cohesive teams, and (2) the need for individual accountability. Thus, half of your project grade will be based on what your team is able to achieve as a whole and half will be based on your individual contributions to the project (i.e., your productivity).

7.1.1 Team Achievement

Teams will complete a series of project milestones, each with its own goals and instructions. Milestones will be evaluated based on criteria, which include the following:

- Quality of planning and design artifacts
- Effectiveness of communication
- Discipline in following software engineering processes and procedures

Additionally, at the end of the project there will be a final evaluation of the product produced by the team. This evaluation will focus mainly on the quantity and quality of features produced.

The marks awarded for each of the above items will generally applied to the team as a whole (i.e., everyone on the team will receive the same marks; see exceptions for low individual productivity below).

7.1.2 Individual Productivity

7.1.2.1 Regular Productivity

The majority of your individual productivity points are associated with *regular productivity*. Each team member will be assigned certain tasks for each milestone. It is expected that each team member will complete their assigned tasks in a timely manner. It is also expected that team members will be continuously productive, and not to put off their work, rushing to slap something together at the last minute. Failure to do so may result in deductions from your regular productivity grade.

7.1.2.2 Above and Beyond Productivity

To achieve the highest grades in the course (A/A+), you will need to go above and beyond the call of duty; thus, your individual productivity grade also accounts for *above and beyond productivity* (aka *A&B*). Throughout the course, you will have the opportunity to take on special roles or to negotiate A&B tasks to do in addition to your regular task assignments. There is no limit on the number of A&B points you can earn, but note that you will need at least 5 A&B points to get full credit.

7.1.2.3 Additional Productivity Policies

- **Deduction for Unproductiveness:** A student who demonstrates unsatisfactory productivity may also lose points on the associated milestone and also the final-product evaluation. Such deductions are meant to account for the lack of contribution made by an unproductive team member to the project.
- **Late Work:** You are expected to complete work on schedule, as deadlines are a part of the real world. Work will not be accepted late unless there are extenuating circumstances and prior arrangements are made with me.
- **Limit on weekly A&B earnings.** You may earn a maximum of 2 A&B points per week for negotiated A&B tasks. This policy is mainly to prevent students from putting off doing A&B work until the very end of the semester, and then flooding the instructor with low-quality work in an 11th-hour attempt to earn more points.

7.2 Quizzes and Exams

Quizzes and exams will be administered in class and will be closed everything (i.e., closed book, closed note, closed neighbor, etc.).

In general, makeup quizzes/exams will NOT be administered. If you have an extenuating circumstance, you should notify me as soon as possible. Makeups will only be given under extreme circumstances and if I approve the absence before the quiz/exam is given. All excused absences must be documented (e.g., with a doctor's note).

7.3 Homework

There will be a series of homework assignments that students must complete. These will have hard deadlines, and late submissions will not be accepted.

7.4 Participation

Students are expected to

- arrive on time to class,
- stay until the end of class, and
- participate in the middle.

You will begin the semester with 13 participation points. If I notice that you are missing from class at any time, I will deduct 1 point for that day. At the end of the semester if you have 10 or more points, then you will receive full credit for participation (i.e., you can miss 3 days without penalty); otherwise, you will receive a percentage of your points out of 10 for participation.

Be forewarned:

- I take attendance and/or give a quiz at the beginning of class.
- I like to do lots of in-class activities, so the odds of me noticing your absence on a given day are pretty good.

8 Accommodations for Disabilities

Reasonable and appropriate accommodations will be provided to students with disabilities who present a memo from Disability Resources for Students (http://www.memphis.edu/drs/).

9 Plagiarism/Cheating

Plagiarism or cheating behavior in any form is unethical and detrimental to proper education and ***will not be tolerated***. All work submitted by a student (projects, programming assignments, lab assignments, quizzes, tests, etc.) is expected to be a student's own work. The plagiarism is incurred when any part of anybody else's work is passed as your own (no proper credit is listed to the sources in your own work) so the reader is led to believe it is therefore your own effort. Students are allowed and encouraged to discuss with each other and look up resources in the literature (including the internet) on their assignments, but ***appropriate references must be included for the materials consulted***, and appropriate citations made when the material is taken verbatim.

If plagiarism or cheating occurs, the student will receive a failing grade on the assignment and (at the instructor's discretion) a failing grade in the course. The course instructor may also decide to forward the incident to the Office of Student Conduct for further disciplinary action. For further information on U of M code of student conduct and academic discipline procedures, please refer to: http://www.memphis.edu/studentconduct/misconduct.htm.

9.1 Course-Specific Instructions
- Teammates (i.e., members of the same team) may collaborate and share work however they see fit; however, if asked to report what each team member's contributions were, students must provide honest responses.
- Students from different teams may not collaborate in this way.
- Teammate collaboration is limited to project work, and is not allowed on any other course work (e.g., homeworks, quizzes, exams), unless specifically noted.

9.2 TurnItIn (Academic Integrity)

Your written work may be submitted to Turnitin.com, or a similar electronic detection method, for an evaluation of the originality of your ideas and proper use and attribution of sources. As part of this process, you may be required to submit electronic as well as hard copies of your written work, or be given other instructions to follow. By taking this course, you agree that all assignments may undergo this review process and that the assignment may be included as a source document in Turnitin.com's restricted access database solely for the purpose of detecting plagiarism in such documents. Any assignment not submitted according to the procedures given by the instructor may be penalized or may not be accepted at all.