CS253: Software Development and Operations

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What is this course about?

Understanding the software development process and tools

Why should you care?

- Writing large software requires different skills than those required for cracking coding competitions—sprint versus marathon
  - Talk to your TAs :)

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- I have often seen students joining me having high ranks in coding competitions, but failing miserably on large codebases—a good coder is not always a good software engineer!

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- Technical Communication
- Management Skills
- Lots, lots, lots....lots of patience

What will we learn (subset of)

- Software Engineering Principles
  - SDLC (Waterfall model, agile)
  - Design patterns, antipatterns
  - SOLID principles, Code smells
  - Software Documentation
  - Tools: jira + jira agile plugin, EPF Composer, Doxygen
- System Software
  - Compilers, OS
  - Tools: gcc, bash scripts, cron jobs
- Software Modelling (UML, CSP)
- Software Testing
  - Testing Basics, Statistical Testing
  - Tools: gcov, gtest, junit

What will we learn (subset of)

- Software Security
  - Security bugs, Fuzzing
  - Tools: afl, libfuzzer, google fuzzer, JQF
- Software Versioning
  - Versioning basics: Centralized versus Distributed version control, Semantic Version, Build based version Package and dependency management
  - Tools: git, pip
- Software Building
  - Tools: Makefile, Ninja Builds
- Programming Editors
  - Vim, emacs, IntelliJ

What will we learn (subset of)

- Software Debugging
  - Debuggers, Sanitizers
  - Tools: gdb, DDD, valgrind, electricfence, sanitizers
- Software Performance
  - Tools: gprof, perf, hotspot
- Software Deployment
  - Tools: docker, CI/CD - Travis, Heroku, Netlify
- Modern Software Dependencies
  - Web: HTML, javascript, php
  - Databases: mysql
  - Machine Learning: keras
  - Data analysis: R, Matlab/Octave, scipy/numpy
- Also planning some guest lectures from industry

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- The assignments/exams will often test concepts beyond the lectures

Grading Scheme

- **NO Written exams**
- Hands-on assignments
- Mid-sem/End-sem **hands-on** exam (depends on the platform for proctored exams)
- Course Project (perhaps not, depends on success of proctored exams)
- .... tentative at the moment, will finalize after checking out the feasibility of proctored exams...

Honesty Code

Use of unfair means in course-work:

1. If a student cheats or uses unfair means in a course,
    1. The student will get an F in the course.
    2. The student will **not** be allowed to drop the course.
    3. The name of the student will be made public to the students of the course.
    4. A complaint will be sent to SSAC for disciplinary action.
    5. An intimation will be sent to DoAA to be kept in the student's record.
    6. The matter will be referred to the *departmental ethics committee*.
2. A repeat offender, even if not caught earlier, will be given stricter punishment.
    1. All applicable actions of the previous point will be taken.
    2. The information will be shared with everyone in the department.
    3. The department will recommend termination.

https://cse.iitk.ac.in/pages/AntiCheatingPolicy.html

Mode of conduct

- Live lectures (recorded and uploaded) [class timings?]
- Auditing may not be possible (due to operational constraints)