CSE 416, Section 1

Software Engineering

Session 1

General Class Issues

- Dr. R. Kelly (contact info on class Web site)
- Synchronous remote class (Zoom sessions)
- Requirements
  - CSE major
  - CSE316
  - U4 standing
- Helpful courses - CSE305, CSE333, CSE337, CSE356, and CSE373

This is your capstone course

Texts

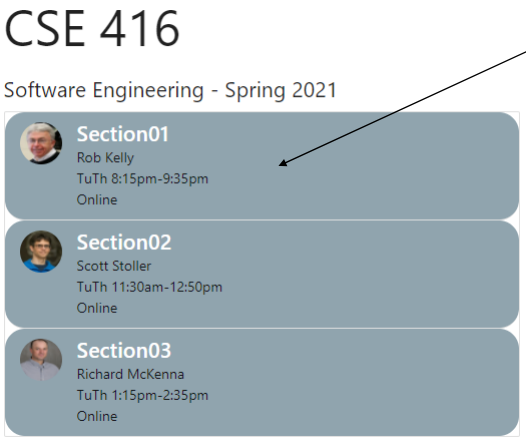
- No official text
- Supplemental texts
  - Head First Object-Oriented Analysis & Design
  - Head First Design Patterns
  - UML Distilled

Other reading will be introduced in class

Learning system design and development is better done through doing (not reading)

CSE416 Web Site

- www3.cs.stonybrook.edu/~cse416/



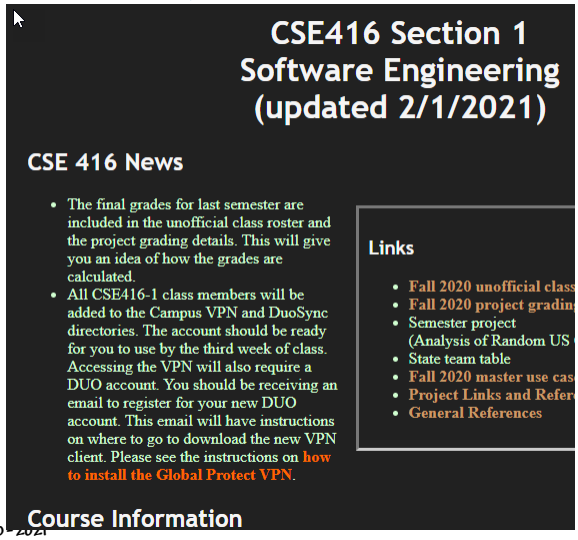
Link to Section 1

Ability to change sections of CSE416 is somewhat limited

Class Web Site

- www3.cs.stonybrook.edu/~cse416/Section01/
- Check it regularly for
  - Syllabus
  - Office hours / location / e-mail addresses
  - Assignments and lecture code
  - Class notes (pdf)
    Print notes before each class
  - References
  - Lots more

We do not use
Blackboard for this class



Zoom Class Sessions

- Zoom invite sent a few hours before scheduled class time
- I will try to open the Zoom session 30 minutes before class time for unmonitored student discussions
- If you are in an environment OK for video, please enable your video (helps me to see who is out there). If not, please use a photo.
- Please mute your audio until you are ready to speak
- Please use chat to post any question or comment. I check the chat screen every few minutes, and I'll repeat comments and answer questions that are helpful to other students.
- There is no posted recording of each Zoom session, but ask for permission to record the session to your computer (TA will grant permissions at the start of each class)
- We'll end the class no later than the official class end time, but I will stay on-line for extra questions

Course Outcomes

- An ability to perform project planning, requirements analysis, and system/test design.
- An ability to work as a team to produce software systems that meet specifications while satisfying an implementation schedule.
- An ability to produce professional quality oral/written presentations of system designs, reviews, and project demonstrations.

Goals

- Apply many skills you've learned to one project
- Improve your oral communications skills
- Learn to
  - build a system too large for one person
  - work as part of a team
  - decompose a project into a set of smaller builds
  - build maintainable code
  - design first and code later
  - use design approaches
  - use design tools
  - present your work as a group

Development approach consistent with previous CSE courses

On-Line Format

- Synchronous - Zoom sessions at the time of the scheduled class
- No video capture made available - important you participate in each class session
- Class interaction is important - enable video during class, but mute your mike unless you are asking a question or presenting
- Use Zoom chat for most questions
- No written exams - midterm exam will be a 15-minute oral exam

Approach

- Emphasis on thinking and designing
  - Not memorization
  - Not trial and error
- Use a development process that resembles industrial work environments
- Write code with considerations for
  - Team coordination
  - Long term maintenance

Reading Vs. Doing

- Class will cover software engineering practices
- You learn by reading, listening, discussing, and doing (most important)
- Usually we will discuss a topic in class before you include it in your project - but not always
- We will model many software engineering activities in the classroom
  - Design reviews
  - Code reviews
  - Project Presentations

You will get experience in group software activities

Grading

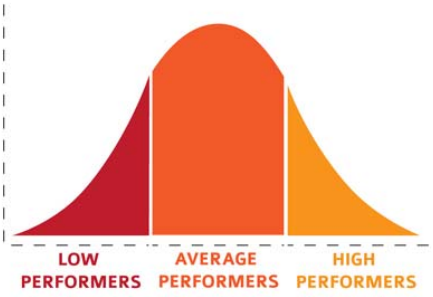
- A, B, C ... grades
- Grade basis
  - Project
  - Exam
  - Oral communications (class discussions and presentations)
- One mid-term oral exam (Zoom session)
- In-progress grades will be available on the class Web site, make sure that you check it regularly

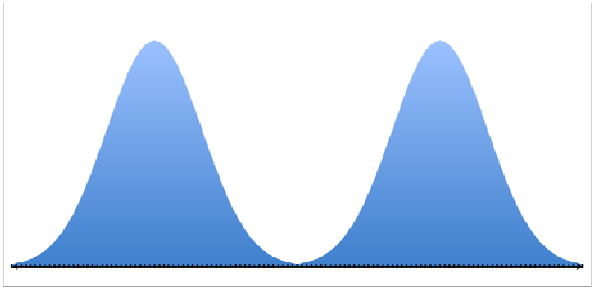
Oral communication component rewards teams for "volunteering" for preliminary class presentations

A large class size might make for limited class presentations

Grading Curve

Grading curve (A-F) could be a bell curve or (more likely) bi-modal, depending on project quality





CSE308 Grading History (Kelly)

Grades	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Fall 2018
As	56.6%	41.5%	45.6%	38.0%	52.1%
Bs	24.6%	41.4%	38.2%	54.0%	28.2%
C+, C	17.0%	14.3%	5.8%	4.0%	14.1%
C- and below	1.9%	2.9%	10.4%	4.0%	5.6%

- No limitations of a bell curve (no limits on As or failing grades)
- Demonstration of good CS skills needed to pass
- Class interaction helps teams help each other
- No possibility to "hide" within a team
- No Incomplete grades - except for spring 2020 (pandemic) semester

Grading

- Final grades are calculated based on a formula (no subjective grading)
- Formula weights all the components of the class
  - Project -60%
  - Mid-term exam - 25%
  - Oral communications - 15%
- Final grade is based on your total score (the higher the score, the higher the grade)

Grade Sheet

- Unofficial class roster
- Check it regularly
- Ask for more feedback if you are not getting enough in class or in e-mail

416 ID	Mid-term		Oral Comm.				Project	Final	Rank	Final
	Score	Grade	In-class	Project	Total	Norm	Total	Avg.		Grade
1	75.0	A		38	38	66.7	87.5	81.3	37	B+
2	59.5	B-		37	37	64.9	76.4	70.5	67	C
3	79.5	A	2	35	37	64.9	87.5	82.1	31	B+
4	83.0	A	15	40	55	96.5	101.9	96.4	1	A
5	73.5	A	12	40	52	91.2	82.6	81.6	34	B+
6	61.3	B	1	35	36	63.2	87.4	77.2	50	B
7	64.0	B+	12	36	48	84.2	82.6	78.2	47	B

Grade sheet also includes a ranking column

You will get your CSE416 ID in an e-mail

Project Grade Sheet

- Your project is graded incrementally, check it regularly
- Ask for more feedback if you are not getting enough in class or in e-mail

Some use cases are required

Prototype GUI Review				Design				Code Review				Final Demo									Total Oral	Final Project
Oral Comm.	Quality	+	Score	Oral Comm.	Quality	+	Score	Oral	Quality	+	Score	Oral	Quality	+/-	Total Quality	# Req. Not Done	Total UC	Adj. UC	Exp. UC	Factor	Score	Comm.	Score
10	80	5	85	8	90	0	90	10	95	0	95	10	92	0	92	1	25	23	27	0.85	78.4	38	87.5
10	88	0	88	8	88	0	88	10	90	0	90	9	80	0	80	4	24	16	27	0.59	47.4	37	76.4
10	80	5	85	5	90	0	90	10	95	0	95	10	92	0	92	1	25	23	27	0.85	78.4	35	87.5
10	93	0	93	10	92	0	92	10	94	5	99	10	98	0	98	0	34	34	27	1.20	117.6	40	101.9
10	91	-10	81	10	85	0	85	10	94	0	94	10	85	0	85	2	26	22	27	0.81	69.3	40	82.6
10	85	5	90	5	75	0	75	10	70	0	70	10	97	0	97	0	33	33	27	1.20	116.4	35	87.4
10	91	-10	81	10	85	0	85	10	94	0	94	6	85	0	85	2	26	22	27	0.81	69.3	36	87.6

Expected number of use cases might vary with the size of the team

Final score is the weighted average of the GUI prototype, design review, code review, and final demo

Academic Integrity

- Representing another person's work as your own is always wrong
  - Assignments
  - Exams
- Gaining an unfair advantage in grading harms other students
- Suspected instances of academic dishonesty will be reported to the Academic Judiciary
- For details, refer to the Academic Judiciary Web site (link on class home page)

You may talk with teams from previous semesters, but not use any of their code, design documents, etc.

Project Team

- Target - 4 students per team
- Typical team composition
  - Data gathering/preprocessing
  - Server programmer
  - GUI designer/programmer
  - High performance computer (SeaWulf)
- Individual responsibilities determined by team
- You will form your own team by 2nd week
  - Be very careful in selecting teammates - your grade might depend on it

Number of team members and responsibilities of members might vary

Send me an e-mail with the names of your team members

Project Team Formation

- Very important to form your team as early as possible - it lets you start work on the project early
- Email me your team information (just teammate names is fine to start) as soon as you can. I'll respond with your initial team name and post the team on the class Web site.
- I will set up at least one unmonitored Zoom session for any students looking for a team

Group	Group Members
Astros	Ahmed Khan, Robert Leung' Brian Zhu, and Kenny Hu
Brewers	David Zhao, Matthew Ng, Peter Hwang, and Jonathan Tsui
Cardinals	Michelle Huang, Tina La, Vivian Lam, and Lisa Zheng
Diamondbacks	Gary Jiang, Hui Chen, Jimmy Lin, and Timothy Shi

Project Grading

- Project team grade can vary among team members based on participation in reviews
- Total project grade determined from individual component grades (e.g., code review)
- Points deducted for late submission of components
- No Incomplete grade for an incomplete project
- Project score will be calculated from
  - GUI prototype
  - Design review
  - Code review, and
  - Final project presentation

Think of presentations as oral exams

Project Team Revisions

- Any time during the semester, a project team can request a split of some team members
- If this occurs
  - Each member of the team will have access to the work of the team as of the date of the split
  - Resulting members can continue with a smaller group (with scope revisions) or join another group
- Helps to encourage all team members to work equally hard on project items

Do not wait too long to recommend a revision of your project team

Assignments

- Project submit process will be defined during the semester (once the TAs are assigned)
- Submit once for the group
- Feedback
  - You may get feedback from TAs (time permitting), but remember that your project grades are determined during your formal project reviews
  - Good to volunteer in class for mock reviews to get feedback
  - Feedback to other teams mock reviews will be important to your project development
  - Submitting on-time counts to your grade
- Details once TAs are assigned

Oral Communications Grade

- Oral communications
  - A factor in your project presentation grades
  - Very important to "volunteer" for in-class presentations
- Components
  - Volunteer presentations
  - Interaction in class (e.g., questions, experiences, etc.)
  - Formal project-related presentations
- Good communications takes lots of practice – the class is the place to get that experience

Being silent is the big risk to your grade

You will get feedback on your presentation technique as well as your technical content

Presentations

- Many steps in the project will involve "volunteer" and required presentations from groups
- Most required presentations will be outside normal class hours
  - Available time slots will be posted a week or so before the presentation period
  - Send me an email to request a presentation time slot
- Presentations model SW group activities
- Presentations allow feedback to improve the project
- Presentations should show preparation, be succinct, and be targeted to the level of the students in the class
- Non-presenters will learn problems to avoid along with solution techniques

Example - Oral Communications

- Analysis of another student's work should:
  - Be offered in a way that is positive and respectful of the other student
  - Show an understanding of the material the other student presented
  - Contribute to the overall class understanding of the material
  - Usually offer a differing opinion of an aspect of the system design or a consideration not previously addressed

Teamwork

- The project will give you good teamwork experience
- Important that all team members contribute to the team efforts
- All team members are expected to contribute during the project reviews
- Teamwork is usually tested in the mid-term exam

Project Technologies

- Languages - Java, JavaScript, and Python
- Client/Server Communications (Http and/or Web Sockets)
- Web development -Tools constructed over the Servlet API
- Scripting - server and/or client scripting
- Relational DB- ORM (JPA/Hibernate or JDBC)
- Python libraries
- High performance computing

Select teammates to get technology balance

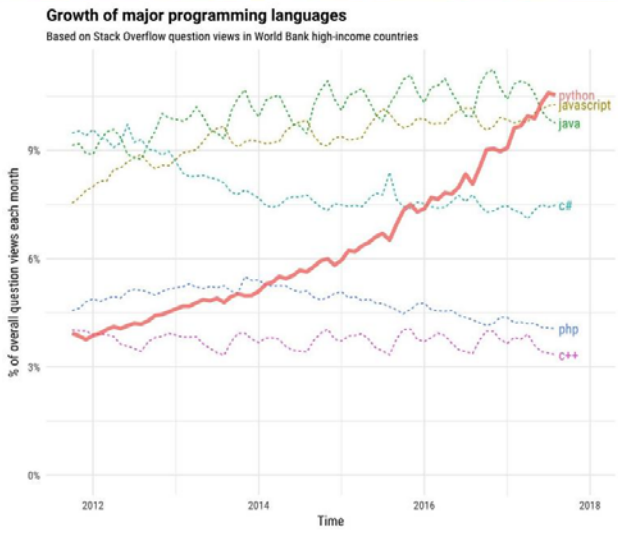


Image: TechRepublic.com

Project

- Project development will include
  - Web GUI
  - System logic (algorithms)
  - Data generation
  - Client-server coordination
  - Re-use of existing code
  - DB
  - DB Persistence layer
  - Performance analysis (especially for the SeaWulf processing
  - Testing

Evaluation of results will be an important part of the project

Project will require you to consider system performance in your design and development

Spring 2021 Project

- Evaluating and comparing the random congressional districts generated on a supercomputer
  - OO and non-OO software development
  - Significant requirements analysis
  - Some algorithmic analysis (graph algorithms)
  - Significant performance implications

There will be a multi-stage published requirement specification (set of use cases)

Project Approach

- When you develop the project, you will follow standard software engineering practices found in industry today
- Quality software philosophy
  - Outcome measurement
  - Process improvement
  - System improvement

Emphasis on iteration based models

Grading philosophy supports incremental improvement

Hardware Requirements

- Software for the course should be available to you for your own computer
- If you need to use a University computer for assignments, studies, etc. you can use a CS Lab
- You will need to use the Stony Brook SeaWulf computer for some high compute processing
- Your server can be hosted as a localhost or some non-SBU cloud server

Your development environment will not initially require multiple processors, but your system should reflect concurrency issues - and later testing will run on a large multi-core system

Development Environment

- Most of the server side part of your project will be developed in Java (and supporting languages, libraries, frameworks, etc.)
- Other languages (e.g., JavaScript, Python) will be used for specialized components (e.g., GUI, data preprocessing, SeaWulf processing)
- You can use any Java development environment (e.g., Eclipse, IntelliJ, NetBeans) you are comfortable with, but your IDE
  - Should be compatible with Java 8 or later
  - Should support Java EE 8

Approach to Tools and Libraries

- Tools are not a fundamental part of the course
  - (-) Rare to find a tool dominant over time
  - (-) Tools can lessen understanding of the underlying technology
  - (+) Tools can be very helpful in improving the time for development
- You can use tools / libraries when they facilitate development without lessening understanding

How to Get Help

- Don't get stuck on a problem - ask for help
- TAs
  - Probably not available until 3rd week of class
  - TAs should be able to help you use most of the libraries, frameworks, IDE, SeaWulf
- Send me general e-mail if you are having trouble
- See me during office hours (or by appointment)

Office hours and appointments done through Zoom

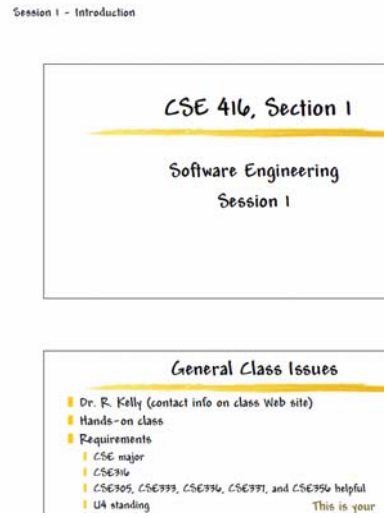
Piazza

- Piazza is a Q&A platform designed to get you answers from classmates and instructors
- It serves as a forum to allow you to collaborate and solve common challenges
- Remember that helping classmates does not negatively impact your grade (no curve)
- You can post any doubts you have or errors you may encounter, and we will post our answers on Piazza directly
- You are also encouraged to answer any questions posted by your classmates. This way when an issue is resolved, everyone gets to benefit and learn from the answer.

Critical mass is important to effective use of Piazza

Lectures

- Lecture slides will be available at the class Web site before each lecture
- Print a copy of the slide handout before class and use it to make notes
- Be sure to review the slides before each exam


Session 1 - Introduction

CSE 416, Section 1

Software Engineering
Session 1

General Class Issues

- Dr. R. Kelly (contact info on class Web site)
- Hands-on class
- Requirements
  - CSE major
  - CSE316
  - CSE305, CSE333, CSE336, CSE371, and CSE356 helpful
  - U4 standing

This is your

Topics

- Software development process
- Software lifecycle
- Requirements
- Use cases
- UML
- Patterns
- Database abstraction
- Modularity
- Testing
- Code conventions
- Code reviews
- Developing for maintenance
- DB development

Emphasis is on hands-on design and development, not lectures

You are expected to know every aspect of the project development

Your First Assignment

- Send me an e-mail
  - E.g., (Hi!, name, id#, "I love Stony Brook")
  - Put "CSE416 - HW#1" in the subject line of the e-mail message