CSE 416, SECTION 1

Software Engineering

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General Class Issues

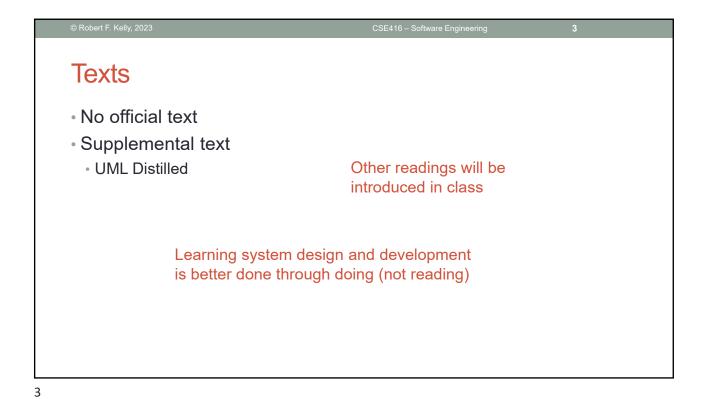
- Dr. R. Kelly (contact info on class Web site)
- Face-to-face class (with some synchronous Zoom sessions)
- Requirements
 - CSE major

This is your capstone course

- CSE316
- U4 standing
- Helpful courses CSE305, CSE333, CSE337, CSE356, and CSE373
- Details on the course Web site

Ability to change sections of CSE416 is somewhat limited

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CSE416 Section 1 Software Engineering (updated 8/26/2024) CSE416 Web Site CSE 416 News · Check it regularly for Syllabus Course Information Course calendar Office hours / location / e-mail addresses Assignments and lecture code · Class notes (pdf) References Lots more https://www3.cs.stonybrook.edu/~cse416/Section01/

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Format

- In-person and synchronous on-line (Zoom)
- Most sessions are planned to be offered in-person
- Planned on-line sessions
 - Mid-term oral exam
 - Some student reviews (e.g., design reviews)
- Possible additional on-line sessions
 - Due to Covid restrictions
 - Due to student and/or instructor quarantines

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I should be able to schedule

most requests within a day

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Office Hours

- Posted hours
 - Mondays, 5:00PM-6:30PM
 - Wednesdays, 2:00PM-3:30PM
- All office hours done through Zoom
- Student Zoom meetings are both during posted office hours and outside of posted office hours
- Send me an e-mail request for a Zoom meeting, and I will schedule it no later than the next office hours block
- All office hours sessions are scheduled

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When (If) We Have 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. Verbal questions are also OK.
- There is no posted recording of each Zoom session, but ask for permission to record the session (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 online for extra questions

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In-Class Session Policies

- · We will be consistent with Stony Brook policies
- Please do not attend class in person if you are experiencing any symptoms consistent with Covid

If you wear a mask, remember that masking makes in-class communications more difficult, so please speak slowly and loudly when interacting

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Course Outcomes

- An ability to perform project planning, requirements analysis, and system/test design.
- An ability to work effectively as a member of a software development team.
- An ability 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.

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Informal Course 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

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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

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How This Project is Different from Industry

- · We only use free tools
- We integrate differing development languages and approaches
- · We emphasize approaches based on
 - CS courses
 - Standards
- We do not emphasize some software engineering steps, as with:
 - Concurrent user testing
 - · Preliminary performance analysis
 - Formal build testing
 - Customer requirements review

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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

Oral communication component rewards teams for "volunteering" for

preliminary class presentations

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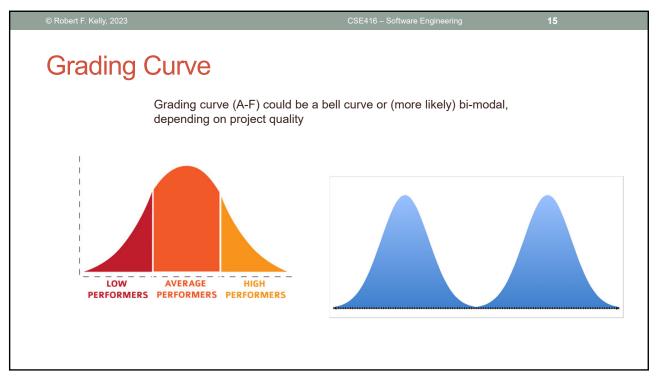
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Grading

- · A, B, C ... grades
- Grade basis
 - Project
 - Exam
 - Oral communications (class discussions and presentations)
- Mid-term exam 15-minute 1-1 session (Zoom session)
- In-progress grades will be available on the class Web site, make sure that you check it regularly

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CSE416 Grading History (Kelly) Grades Spring Spring Fall **Spring** Fall Fall **Spring** 2024 2023 2023 2022 2022 2021 2021 As 47.9% 50.0% 51.1% 51.6% 60.7% 37.9% 44.7% Bs 27.1% 35.7% 40.0% 35.6% 30.3% 37.9% 30.3% C+, C 4.4% 18.8% 3.4% 6.0% 3.6% 20.3% 20.1%

12.1%

0.0%

11.1%

 No limitations of a bell curve (no limits on As or failing grades)

6.7%

- Demonstration of good CS skills needed to pass
- Class interaction helps teams help each other
- No possibility to "hide" within a team

6.3%

No Incomplete grades

Below C

Virtually all non-passing grades are due to lack of work or poor preparation

7.9%

4.1%

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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)

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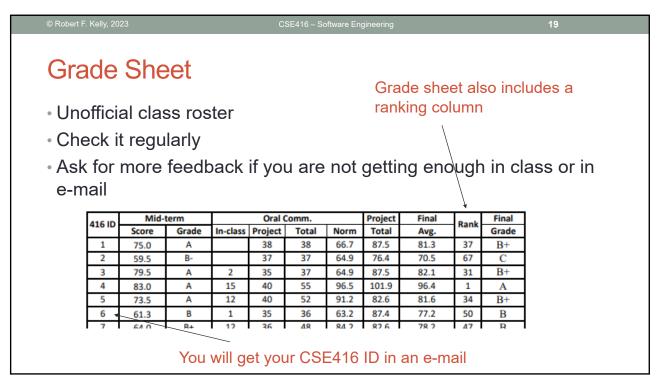
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Exams

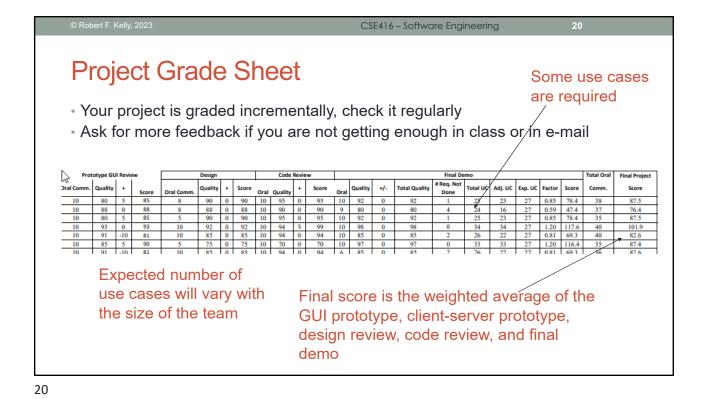
- No final exam (allows you to focus on your project)
- Mid-term exam
 - Zoom oral exam 15 minutes
 - Possibly no classes during mid-term exam week
 - You sign up for your exam slot (usually 5 exams in a slot)
 - Stay in Zoom waiting room until you are asked to join
 - Questions cover course objectives (e.g., teamwork, design, etc.)
 - Familiarity with your team's work on the project is critical to your midterm exam grade

The best preparation for your midterm exam is work on your project

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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 do not use any of their code, design documents, etc.

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Project Team

- Target 4 students per team
- Typical team composition
 - Data gathering/preprocessing
 - Server programmer
 - GUI designer/programmer
 - High performance computer (SeaWulf)

Send me an e-mail with

responsibilities of members might vary

Number of team members and

the names of your team members

- 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

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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 team's name and post the name on the class Web site
- I will set up at least one unmonitored Zoom session for any students looking for a team

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Project Grading

- Project grades can vary among team members based on participation in reviews, but usually a project grade is the same for all team members
- Total project grade determined from component grades (e.g., reviews)
- Points deducted for late submission of components
- Project score will be calculated from

GUI prototype

No Incomplete grade for an incomplete project

- Client-server prototype
- DB access prototype (if needed)
- Design review
- Code review, and
- Final project presentation

You will have project deliverables, some of which are graded and some not graded

come not graded

Think of presentations as oral exams

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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

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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 grade is 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 helpful
 - Submitting on-time counts to your grade
- Details once TAs are assigned

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Oral Communications Grade

Oral communications

Being silent is a big risk to your grade

- · A factor in your project presentation grades
- Very important to "volunteer" for in-class presentations
- Components

Zoom chat posts count as interaction

- 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

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

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Presentations

- Many steps in the project will involve "volunteer" and required presentations from groups
- · Many 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 your 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
 You are invited to other teams' out-of-class presentations

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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

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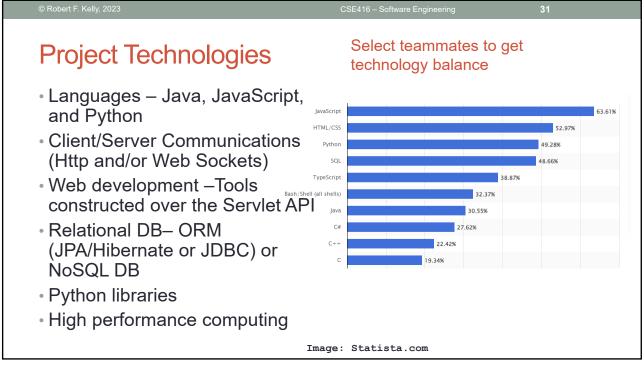
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Teamwork

- 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 assessed in the mid-term exam

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Project

Project development will include

Web GUI (User interface design and visualization design)

System logic (algorithms)

Data generation

Client-server coordination

Re-use of existing code

DB (with persistence layer, if relational)

Performance analysis (especially for the SeaWulf processing)

Testing

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

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Fall 2024 Project

Important that your team shows the ability to write in different programming styles

- Major components (client, server, supercomputer, and preprocessing) use three different programming languages (JavaScript, Java, and Python)
- Conduct a income demographic analysis of voting districts
 - OO and non-OO software development
 - Significant requirements analysis
 - Some algorithmic analysis (graph algorithms)
 - Visualization of the results

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

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Requirements Analysis

Expect changes in your requirements during the semester – like many SW projects

- You will develop some of your system requirements based on your understanding of the overall problem
- Requirements broken down into use cases (approximately equal units of work)
 - You will be given most use cases in the early part of semester
 - Team can suggest additional use cases
 - The number of use cases (about 60) will likely expand during the semester.
 You will implement about 40 use cases

One course goal is that each team's system is different from other teams, yet similar enough so that design discussions help everyone

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Thinking About Requirements

- Two ways to think about your project
 - Large graph processing problem (e.g., about 10,000 nodes)
 - Real-world political science analysis problem (e.g., techniques to bring fairness into US Congressional redistricting)

You need to consider both approaches when thinking about your project

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Implementation Approach

- Resembles commercial development
- Differs in some ways because goals are to build a system, but do it in a way that has educational goals as well
- Emphasis on technologies covered in previous Stony Brook programming courses
- Emphasis on standards useful for system integration
- · Avoid non-standard, single supplier approaches
- Emphasis on dealing with HTTP limitations through standards (e.g., Servlet API, HTTP attributes, RESTful API, etc.)

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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 iterationbased models

Grading philosophy supports incremental improvement

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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 part of your project
- Your server can be hosted as a localhost or on some non-SBU cloud server

Your SeaWulf 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

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Development Environment

- Your project SW will have the following major components
 - Server developed in Java (and supporting libraries, frameworks, etc.)
 - GUI You can use a client-side framework (e.g., React, jQuery, Angular, et al)
 - Formal client/server separation using standard interfaces
 - Compute engine developed in Python on the Stony Brook SeaWulf processor
 - · Database SQL or non-SQL
- Any Java development environment, but Java 8 or later and Java EE 8
- Any Python development environment, but at least Python 3.8 (be careful about library compatibility)
- Any client screen development tool, but compatible with HTML 5 or later

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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

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How to Get Help

- Don't get stuck on a problem ask for help
- 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)

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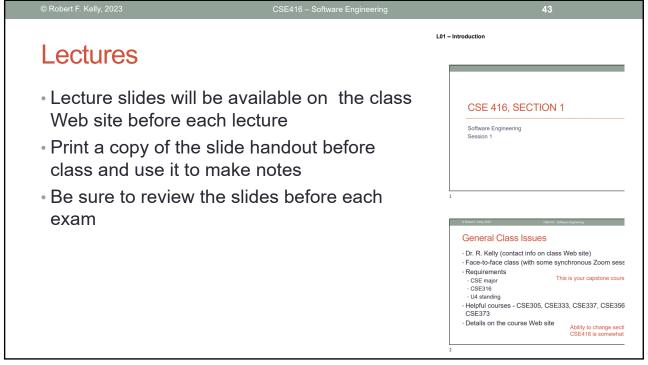
Piazza

Piazza is changing its policies, so this might change

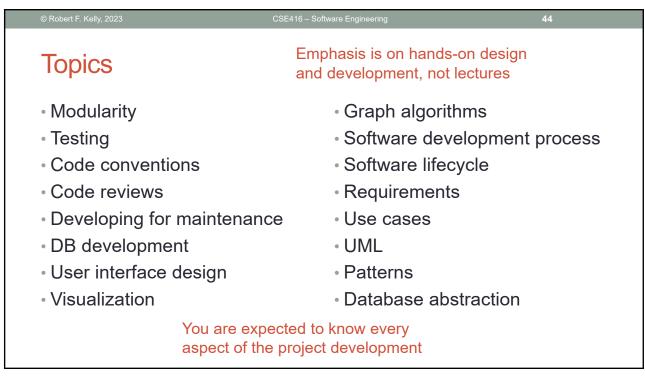
- Piazza is a Q&A platform designed to get you answers from classmates and instructors
- It serves as a forum to allow you to collaborate and solve common challenges
- Remember that helping classmates does not negatively impact your grade (no curve)
- You can post any doubts you have or errors you may 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

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Your First Assignment

Send me an e-mail
E.g., (Hi!, name, id#, "I love Stony Brook")
Put "CSE416-01 – HW#1" in the subject line of the e-mail message

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