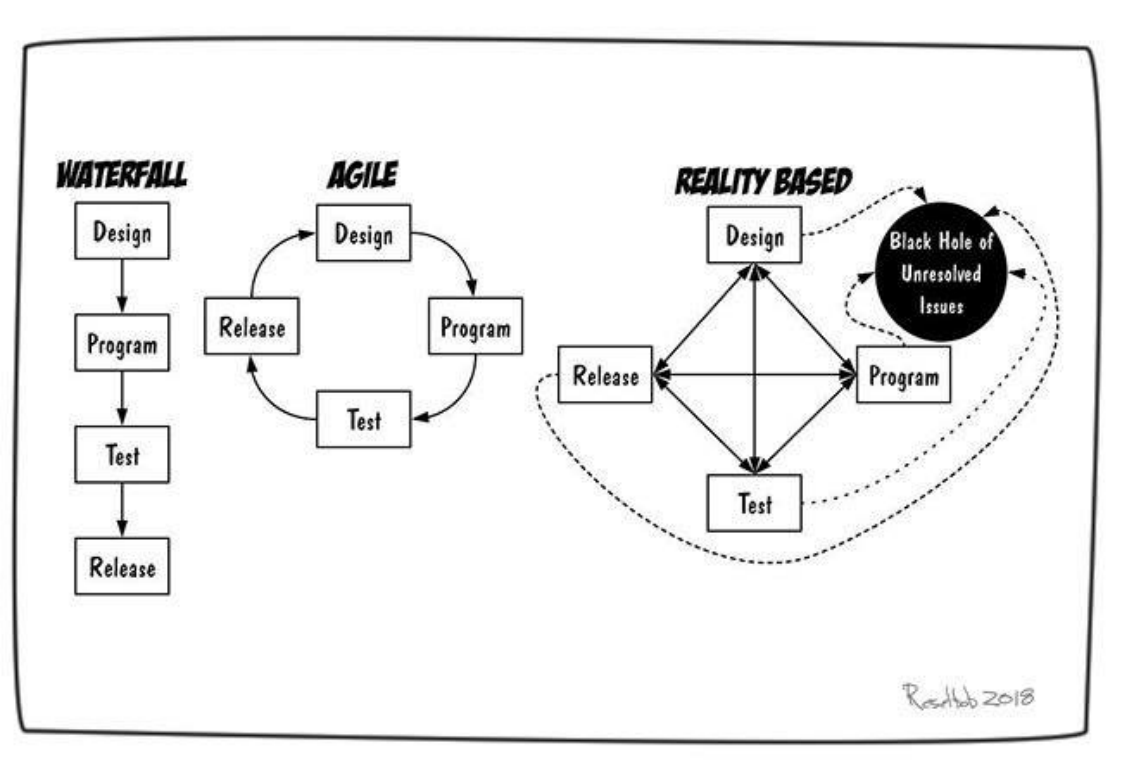
CS 428: REAL-WORLD SOFTWARE ENGINEERING

COURSE OVERVIEW

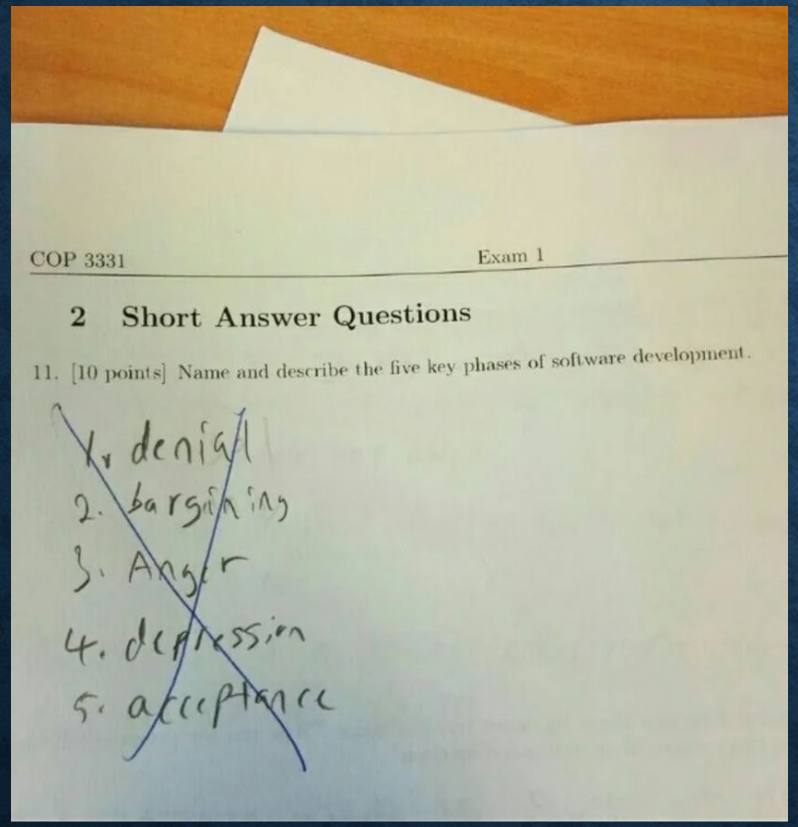
Winter 2022

Bruce F. Webster

WHY THIS COURSE?



WHY THIS COURSE? (CONT.)



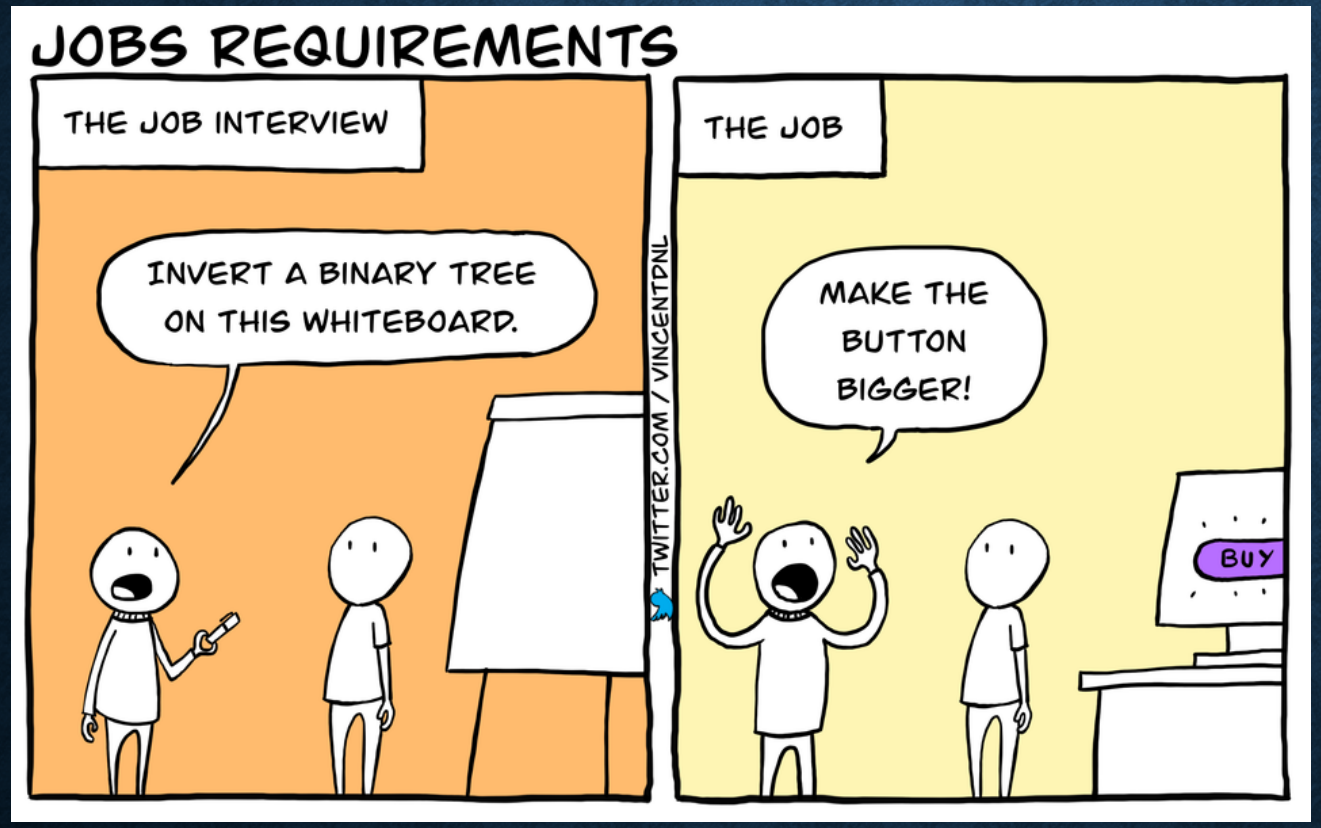
COP 3331 Exam 1

2 Short Answer Questions

11. [10 points] Name and describe the five key phases of software development.

1. denial
2. bargining
3. Anger
4. depression
5. acceptance

WHY THIS COURSE? (CONT.)



WHY THIS COURSE? (CONT.)

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AND FINALLY…

TRUISMS OF SOFTWARE DEVELOPMENT

- Software development is hard and unpredictable (Armour)
- As a result, software specification and estimation are likewise difficult
  - Glass (2002): Estimation is usually done at the wrong time (start of project) and by the wrong people (managers)
  - Spinrad (1998): In creating a new software program, all the important mistakes are made the first day.
- Rate of overruns (schedule, cost) and outright failure is high
  - The first 90% of the project takes 90% of the schedule. The remaining 10% of the project takes the other 90% of the schedule.
  - Requirements explode when you move into design and implementation
- People matter most.
  - Process/methodology is not a panacea or a crutch or a silver bullet
- Ignore or minimize software quality assurance (SQA) at your own peril
- Be on the lookout for organizational dysfunctions
- Observations and experiences?

GOALS FOR CS 428

- **Understand root causes** of success and failure in real-world software development projects
- **Gain practical experience** with fundamentals of the software development lifecycle (SDLC)
- **Better understand** the sociological and interpersonal nature of software development
- **Learn to deal with** a dynamic, changing, and inherently ambiguous work environment.
- **Learn to manage** orders of ignorance as a professional life skill.
- **Help you decide** whether you should accept that job offer

HOW THE CLASS RUNS

- Class website: cs428.cs.byu.edu
- Slack: cs428-w22.slack.com
- Project Wikis: github.com/cs428TAs/w2022/wiki
- Class sessions, assignments and tests: Learning Suite
- Class: every Monday at 3:00 pm in B107 MARB
- Attendance counts as 8% of grade (-2% for each missed class);
  - Excused absences can be made up with my approval by watching video of lecture
- TA: Michael Broson (stand and introduce yourself, Michael!)

SPECIAL ISSUES FOR WINTER 2022

- **No class on 01/17 (Martin Luther King holiday)**
  - This means we need to get projects and teams settled by end of next class, if possible
- **COVID upsurge**
  - I am going to try to have all classes live on Zoom as well
  - In any case, I will record all lectures, and you can watch those. Except…
- **Upcoming travel**
  - I have to testify (as an expert witness) in a very large, very expensive trade secret lawsuit
  - I will be in Dallas for roughly 3 weeks (late January-mid February)
  - I will conduct those classes live via Zoom, if possible
  - If it is not possible, then I will have you watch the equivalent lectures from Fall 2021

GRADING OVERVIEW

- Attendance: 8% (-2% for each class missed)
- Readings: 25%
- Podcasts: 5%
- Midterm: 25%
- Projects: 27%
- Status Reports: 10%
- Extra credit: up to 10%
  - 8% for addition approved book readings
  - 1% for additional Webster articles

READINGS (25% OF GRADE)

- Books (you are responsible for obtaining these) – worth 5% each
  - **The Mythical Man-Month** (Anniversary Edition), Fred Brooks (selected chapters)
  - **Peopleware** (3rd ed.), Tom DeMarco & Timothy Lister
  - **Facts and Fallacies of Software Engineering**, Robert Glass
- Online readings (total of 10%)
  - "The Five Orders of Ignorance" by Philip Armour
  - "Heuristics for Systems-Level Architecting" by Meier and Rechtin
  - Selected sets of readings written by yours truly (Webster #1 through #6)
- Note: these readings will be essential for the midterm
  - Reading schedule for lectures is posted on the class website
- Reading completions are logged in **Learning Suite**
  - Don't get behind; check **Learning Suite** for actual due dates
  - But you can read ahead as much as you'd like

WHY THESE THREE BOOKS?

- ***The Mythical Man-Month*** (Brooks): first published in 1975; added to in 1995; remains a classic because it set forth most of the fundamental issues and causes of delays and failures in software projects
- ***Peopleware*** (DeMarco & Lister): first published in 1987; currently in 3rd edition (2013); focuses on individual, team, and organizational impacts on software engineering
- ***Facts and Fallacies of Software Engineering*** (Glass): captures in a succinct, readable format the uncomfortable truths (and fallacies) of software development that so much of the industry still ignores.

VIDEO PODCASTS (5% OF GRADE)

- Starting two weeks from Saturday (1/22), you will need to watch one (1) online video podcast every other week, for a total of 5 podcasts
  - You're choosing from a set of over 20 podcasts, so you can focus on your particular interests
  - However: not a bad idea to pick podcasts on upcoming lecture topics / project deliverables
  - Some are rather long – you may want to check that before you start one
  - You can certainly work ahead
- Each watched podcast counts as 1% of grade
  - Due by midnight on Saturdays (**first one due January 22nd**)

MIDTERM (25% OF GRADE)

- Only test for CS 428 (**no final**)
- Open-book, open-note, open-device test (Monday, March 28th) via LearningSuite
- Expect it to take 2 to 3 hours (timed with 3 hours max duration)
- Must get at least 60% on the midterm to pass the class
- Sample question:

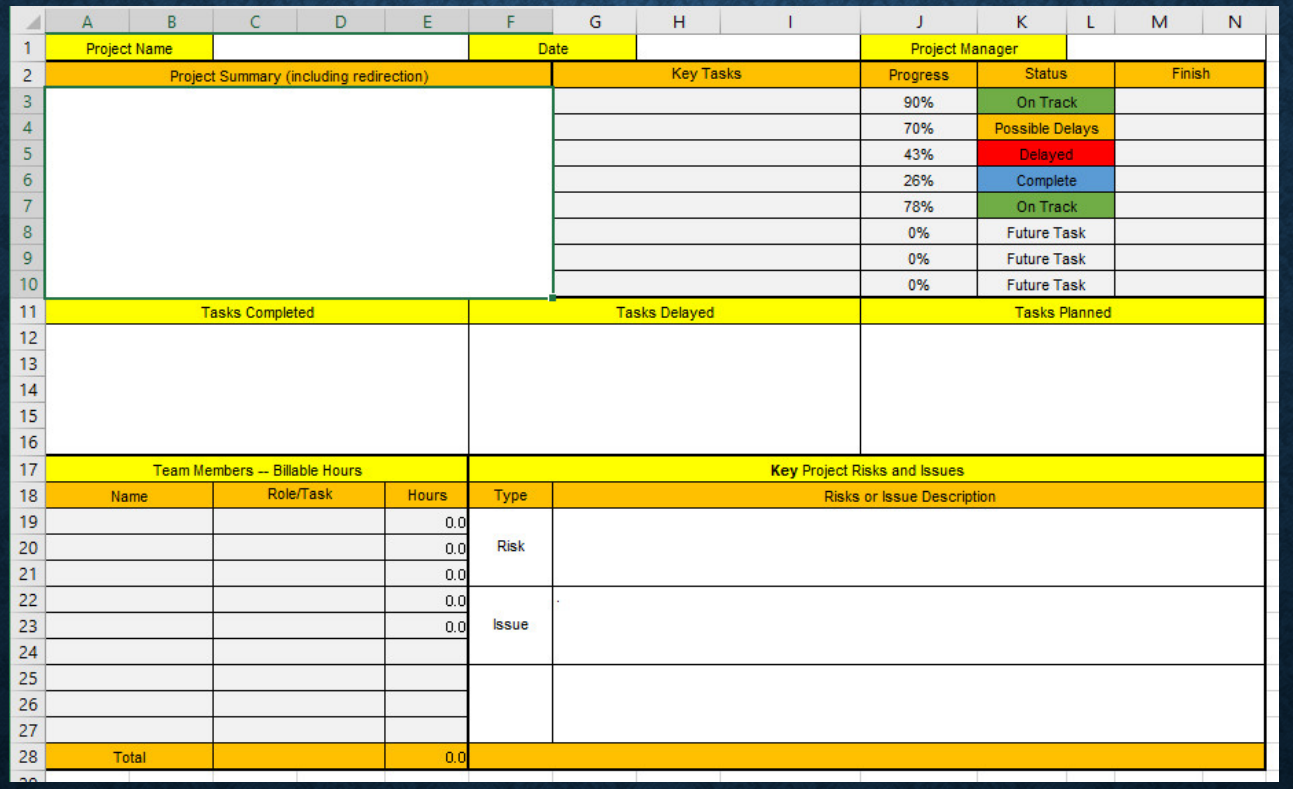
  You have been working for BigCorp for a year or so, mostly doing bugs fixes and feature ad-ons for an existing in-house software system, ROVER. BigCorp now would like to replace ROVER with a new, rewritten-from-scratch system (code name OTTO), which will be hosted on AWS, a cloud service that BigCorp has not used previously. They ask you for your opinion as to both the potential risks of the OTTO project, as well as any recommendations as to how to increase the likelihood of success. At this point, there are no schedule or budget constraints.

  For five (5) points each, list at least two (2) major risk factors that you see with this project, as well as three (3) recommendations for how to best approach the project, with at least one citation for each.

GROUP PROJECTS (27% OF GRADE)

- Everything will be run through and submitted to GitHub: https://github.com/cs428TAs/w2022/wiki
- Everyone needs to create or join **one or more** project suggestions this week on GitHub
- Everyone needs to vote on three (3) projects on GitHub by next class
- Next class (01/10), we'll finalize set of projects with 4-6 people on each
- Goal is to iterate through software development lifecycle process
- As a team, you will have to produce SDLC deliverables and three (3) product demos
- Weekly status reports required from each project, with "billable hours" for each team member
- For ideas, templates, and examples, look at prior semesters' wikis:
  - https://github.com/cs428TAs/f2020/wiki
  - https://github.com/cs428TAs/w2020/wiki
  - https://github.com/cs428TAs/f2019/wiki
  - https://github.com/cs428TAs/w2019/wiki

WEEKLY PROJECT STATUS REPORTS
(10% OF GRADE; STARTING JANUARY 29TH)



Project Name		Date		Project Manager	
Project Summary (including redirection)		Key Tasks	Progress	Status	Finish
			90%	On Track	
			70%	Possible Delays	
			43%	Delayed	
			26%	Complete	
			78%	On Track	
			0%	Future Task	
			0%	Future Task	
			0%	Future Task	
Tasks Completed		Tasks Delayed		Tasks Planned	
Team Members -- Billable Hours			Key Project Risks and Issues		
Name	Role/Task	Hours	Type	Risks or Issue Description	
		0.0	Risk		
		0.0			
		0.0			
		0.0	Issue		
		0.0			
Total		0.0			

WEEKLY PROJECT STATUS INTERVIEWS
(STARTING JANUARY 31ST)

- Michael (TA) will talk/DM with each project leader each week (a few minutes) for a check on how each project is going
- He may also occasionally contact other team members for an independent assessment of how things are going
- Key issue: to ensure **all** team members are **actively** participating in and contributing to the project
- **I reserve the right to adjust individual grades to any extent (including failure) based on lack of participation in team projects**

TEAM PROJECT DELIVERABLES

- #1: Wiki setup for each project (01/15)
- #2: Organization chart and role descriptions (01/29)
- #3: Requirements document (02/05)
- #4: PERT and Gantt charts (02/12)
- #5: Architecture & design documents (02/19)
- #6: Test plan and specification (02/26)
- #7: PROTOTYPE DEMO (02/28)
- #8: WORK-IN-PROGRESS DEMO (03/21)
- #9: FINAL DEMO (04/11)

INDIVIDUAL PROJECT DELIVERABLES

- Code review (w/team member) – by 03/21
- Project/class post-mortem (on LS) – by 04/13

COMMON CLASS PROJECT PITFALLS

- Using a new/unfamiliar technology/language for the project
- Not agreeing early on the technology base (OS, language, libraries)
- Being overly ambitious in your scope
- Individual team members failing to contribute
- Not looking for ways to distribute the workload
- Not keeping all team members 'in the loop' as to next steps or key decisions
- Getting a slow start

OPPORTUNITIES FOR EXTRA CREDIT

- Extra credit books readings (up to 8%)
  - The CS 428 website has a list of pre-approved books for extra credit (2% each)
  - When you have read the book, you must schedule an appointment with me to talk about it
  - If you want to read a book not on the list, you **first** have to get it approved by me
- Extra credit Webster readings (1%)
  - Just read them and take the 'exam' on Learning Suite

GETTING TO KNOW EACH OTHER

- Me (brucefwebster.com, bfwa.com)
  - BSCS (BYU, '78); graduate work in CS (U of Houston/Clear Lake, 80-81)
  - 47 years of working in the information technology industry
    - Two software startups, contribution to multiple commercial & in-house software systems
  - Since 1995, heavy professional focus on why IT projects succeed and fail
    - Corporate consultant on troubled IT projects (size up to $500 million)
    - Testimony before Congress, presentations at conferences, published books and articles
    - Expert witness in lawsuits involving troubled/failed projects (size up to over $1 billion)
- You
  - Why you're taking this class
  - What you hope to get from it
  - Plans after graduation