18-642:
Course Information
Fall 2023

http://www.ece.cmu.edu/~ece642/

ece642-staff@lists.andrew.cmu.edu

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Course Goals

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- Embedded software engineering concepts
  - Practical code quality
  - Practical, industry-strength embedded SW engineering process
  - Embedded System Safety, Embedded-specific Security
  - Generally, things industry wants that most grads don't know
- Hands-on practice at applying concepts
  - Software project material; small but high-quality code
  - Emphasis on improving software, not clean-sheet design
- Learn how to think about embedded systems
  - Homework & discussions to encourage critical thinking
- NON-Goals (things that are not course goals):
  - There is no embedded hardware platform (take an embedded microcontroller course)
  - Not about specific software technology; especially not about Android/IOS/Embedded Linux/…
  - Not about wireless networking, sensor networks, etc.
  - Not about hacking crazy-complicated code

Electrical & Computer ENGINEERING

https://commons.wikimedia.org/wiki/File:CMU_Hamerschlag_Hall.jpg

Course Format

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- Lectures + Quizzes
  - Recorded video (mostly 10-25 min)
  - Canvas quiz at end
- Homeworks
  - Usually create one or two slides
  - Check-off grading
  - Sometimes make a short video
- Group work (1 per week)
  - Joint assignments
  - Peer reviews of project code
  - TA meeting; check-off grading
- Live weekly class meeting
  - Discussion, review
  - Attendance taken (see policies)
- Projects
  - Individual software assignments
    - Programming
    - Industry software practices
  - Emphasizes code quality
  - Cumulative work
- Weekly Status survey
  - Course hours, your questions

In-Class Participation

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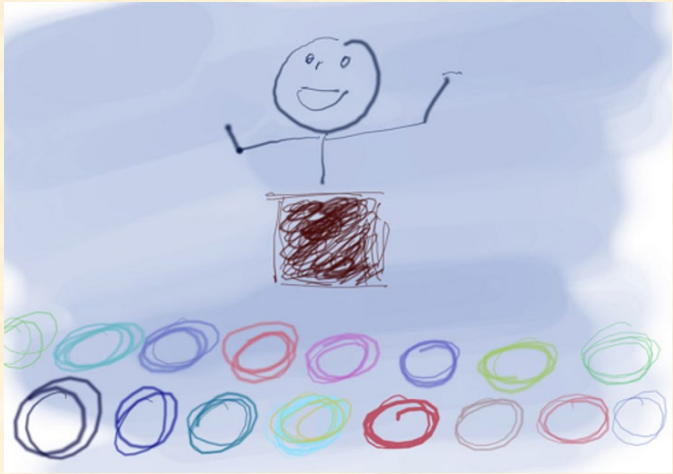
- Attendance is required
  - Make a point of attending the live class session
    - Attendance taken at every meeting
  - If you have an excused conflict, instructor in office hours *before* *next class* will count
  - Poor attendance will affect your grade
- You'll make short homework presentations
  - Mixture of live vs. pre-recorded
  - Typical presentation is 60 – 90 seconds long
    - Concentrate on briefly getting the important points across
- These are low-stakes presentations
  - Preparation is not expected beyond being able to talk about your own assignment
  - Emphasis on good faith participation, not perfection
  - Expectation is adequate English & improvement over semester (English not graded)

https://www.flickr.com/photos/xverges/3092873536



Projects

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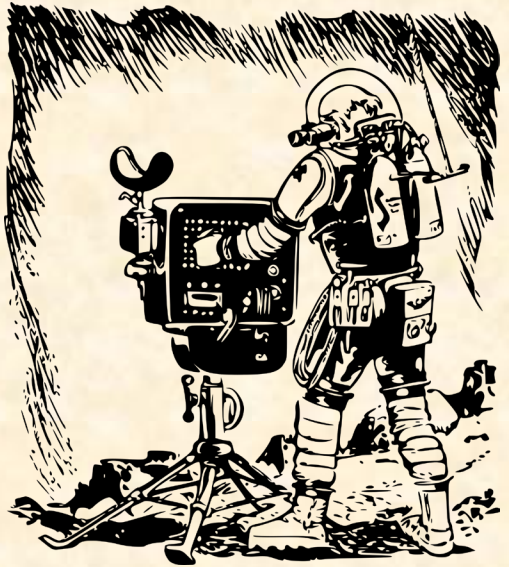
- Mostly code modification & other hands-on activities
  - Some non-trivial programming
  - Emphasis is on *code quality*
  - C++, but emphasis is on plain C in general
  - Light use of Robot Operating System (ROS)
  - Group peer reviews in later project phases
- Projects build upon each other
  - Slacking off early will hurt you later
- Significant increase in project difficulty at project #5
  - You have been warned!



https://openclipart.org/detail/3020/space-pioneers-135

Course Information & Syllabus

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- Main course content – web site
  - http://www.ece.cmu.edu/~ece642/
  - Read the Policies page
  - Read the FAQ page
  - Points to lecture slides, assignments
- Canvas – assignments
  - Pay attention to Canvas announcements
  - Hand-in for all assignments
    - Canvas deadline is the official deadline
  - Lecture & project videos are in the assignment description
  - Used for recording grade info

Fall 2021 Lecture Date	**Lect. #**	**Lecture Slides** *For reference*	**Video Lectures** *Due on Wednesday night; (AV lectures due Sunday night)*	**Homeworks** *Due on Following Monday Night*	**Group Exercise** *Due on Following Tuesday Night*	**Project** *Due on Following Friday Night*
Monday 30-Aug-2021		Classes Start	Project 1 intro video is playable on Canvas assignment page.			Proj #1 (Startup) **Due Fri 3-Sep-2021**
Thursday **2-Sep-2021** *Week 1*	1	Course Topics Overview	Embedded Software Code Quality, Safety, Security (44 min)	HW #01 Self Intro **(DUE Wed 1-Sep-2021)**		Proj #2 (Initial Cleanup) **Due Fri 10-Sep-2021**
	2	Admin Info	Course Overview & Administrative Matters (Video on Canvas only) (40 min)	HW #02 Computer Safety Literacy Stories; slide & video **(DUE Tue 7-Sep-2021)**		
	100	(No slides)	AV: Look Who's Driving (54 min) (PBS Nova)			
	Live:	Discuss: Q&A on course policy & content	Discuss: Self-intro Part 1 (HW #1)	Fill out weekly survey after class each week.		
Mon 6-Sep		Labor Day No office hours				
9-Sep *Week 2*	3	SW Process	SW Process (49 min)	HW #03		Proj #3 (Code Style) Due 17-Sep-2021
	4	Code Style for Humans	Code Style for Humans (15 min)	HW #04		
	5	Code Style for Compilers	Code Style for Compilers (21 min)			
	6	Peer Reviews	Peer Reviews (33 min)		GP #06 Peer Review Exercise	
	Live:	Guest: TBD	Finish Self-Intro/ Peer Review Exercise	Discuss: HW #2 (failure stories)		

Course Grade

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- **Typical class medians: Lectures 99% / Project 95-99%**

Grade	Lecture Quizzes (graded)	Homework (check-off)	Group Assignments (check-off)	TA meetings (timely attendance)	Project (graded)	Weekly Status (check-off)	Attendance
A	All Completed; >=95% average; Maximum 4 late	All completed; Maximum 2 late	Maximum 1 not completed	Maximum 1 missed or substantively late	>=90% average; All project assignments completed Passes all final acceptance tests 1 late penalty forgiven	All completed	Miss at most 1 week
B	Maximum 1 not completed; >=85% average; Maximum 8 late	Maximum 1 not completed (*) plus Maximum 3 late	Maximum 2 not completed	Maximum 2 missed or substantively late	>=80% average; All project assignments completed; Passes majority of final acceptant tests 1 late penalty forgiven	All completed	Miss at most 2 weeks
C	Maximum 3 not completed Note requirement for >=65% on each completed	Maximum 3 not completed (*); Any number can be late	Maximum 3 not completed	Maximum 3 missed or substantively late	>=70% average; All project assignments completed; Might not pass acceptance tests 1 late penalty forgiven	All completed	Miss at most 3 weeks
R	Does not meet all criteria for C	Does not meet all criteria for C	Does not meet all criteria for C	Does not meet all criteria for C	Does not meet all criteria for C	Does not meet all criteria for C	Does not meet all criteria for C

Academic Integrity Overview

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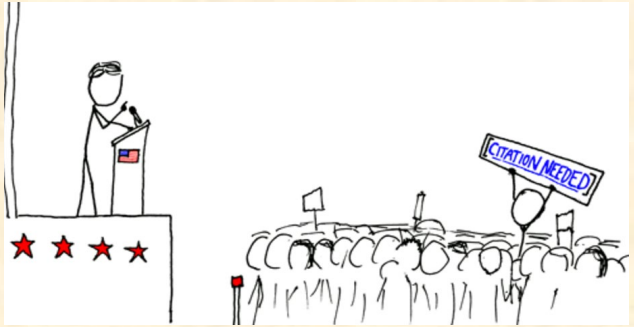
- Zero-tolerance policy for cheating
  - Failure in course for first offense of cheating
  - Yes, we are serious
  - Per CMU policy, both giver and receiver equally guilty
- What's not cheating?
  - Asking course staff for help
  - Using an acceptable resource *and citing it* (e.g., give us the URL)
    - See next slide for "acceptable resource"
    - OK: materials on the course web page/course Canvas account with no citation
  - Asking your friends for help with background activities
    - Understanding what the lecture was saying
    - Understanding *what* the assignment wants you to do (*not how* to do it; *not the answer*)
    - Help with getting tools, infrastructure, and so on running
      - » But not doing things for you if doing that thing is a project assignment



https://en.wikipedia.org/wiki/Randall_Munroe#/media/File:Webcomic_xkcd_-_Wikipedian_protester.png

Academic Integrity: Acceptable Sources

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- Published/WWW material is OK if ALL of following are met:
  1. You make substantive changes or addition
     - *Changes demonstrate mastery of material*, not just cosmetic/superficial changes
     - Reword and summarize what you find in your own words and give a citation.
     - Not OK: simply changing variable names and line ordering on code you got somewhere
     - Not OK: block quote copy & pasted from a source unless that is what we asked for
       - » OK: pasting a news photo or news article in response to "show us a news article"
  2. Sources are not connected to or responsive to this course
     - OK: blog posting that describes a general technique
     - Not OK: solutions for 18-642 at a "study guide" or help site
  3. It's not Wikipedia or similar non-authoritative source
     - Wikipedia is OK for informal orientation, but is not a citeable source unless we say OK
     - OK: It's fine to use Wikipedia references as a *starting point*
     - Not OK: fraudulent citation, including using Wikipedia summary instead of primary source

Academic Integrity: Concrete Examples

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- Not OK: On-line 18-642 “study aid” resources as a starting point
- Not OK: Someone else’s solution as a starting point, even if you change it
- Not OK: Working with a group on homeworks/projects unless we say to
  - Homework questions generally graded on “good try”; often there is no single right answer
  - OK: study group about concepts *before you start* your homework; before-test study groups
  - OK: study group discussion after *all participants* have handed in, and do not revise
- Not OK: Accepting step-by-step instructions from another student
  - Especially bad if this is done verbally to skirt “copying” rules
  - Do not “launder” help by talking as a group to a TA while exchanging peer information
- Not OK: Attendance fraud, signing in for another student, etc.
- Not OK: Quiz cheating
  - Any help from anyone to complete a lecture quiz
  - (Note: you get unlimited chances to try the quiz)
- Be very careful of study group dynamics!

LLM, Machine Learning, ChatGPT, etc.

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- Perspective on Large Language Models:
  - "Hallucination" is in the eye of beholder
    - People decide which answers sound like they are "correct"
  - Trains on code from Web -- BUT -- lots of example code on Web is awful

DA

I see a deer standing still at the side of the road. Will the deer run in front of my car? Yes/No answers only.

[DALLE-2]

[ChatGPT]

No. 1/3

No. 2/3

No. 3/3

Unknown 4/4

Cannot determine. 5/5

No. 6/6

- Policy:
  - LLM query is treated like a web search query
    - Forbidden if query is specific to the requirements of 642 assignments
  - Using LLM-created code in 642 is like using a bad calculator when I'm teaching addition

Other Polices

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- E-mail to: ece642-staff@lists.andrew.cmu.edu
  - E-mail direct to instructor or TA might not be read
  - Only e-mail administrative issues, not substantive technical questions/"doubts"/etc.
    - Go to office hours for help understanding course content, homework, project
  - OK to e-mail about infrastructure problems so we can fix them
- Please be on time to class. We won't wait for stragglers.
- No distracting noises
  - No noisy/messy/smelly food. NO potato chips, crinkly bags/wrappers.
  - Clean up after yourself -- leave classroom clean
  - On-line meetings: mute microphone unless you're speaking
- Mobile devices must not intrude on classroom
  - In general, only use electronics directly in support of the class activity
- No recording, photo, screen capture, live-tweeting, etc. of the classroom
  - Course materials (e.g., handouts) are copyright by instructor; no redistribution
- See CMU Academic Integrity policy: https://www.cmu.edu/academic-integrity/

https://commons.wikimedia.org/wiki/File:Alice_par_John_Tenniel_02.png

Special Circumstances & Wellness

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- If you have a special need, let us know the first week of class
- If we're doing something that's a problem let us know
  - Anonymous e-mail is fine if you prefer
  - Asking staff advisor to tell us is fine if you prefer
- If you're experiencing a problem, let us know
  - You might be surprised about the ways we can help
  - Come to us sooner, not later
    - Not much we can do in last week of class
- If in doubt, ask us
  - Especially regarding academic integrity policy
    - Honest mistakes can be corrected if you're honestly acting in good faith

https://pixabay.com/en/cold-ill-fever-thermometer-1972619/

The “I Wish You Had Told Me” Slide

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- This is an all-remote course, with one live meeting per week.
  - Class is NOT recorded. Be there in person every single week.
  - We expect you to be live on camera during class with few exceptions
- There are two cumulative review homeworks
  - One slide per lecture. Good idea to do these as you do lectures
  - Treat these seriously. They are instead of a mid term + final exam.
- Check announcements daily
  - We expect you to read each Canvas announcement entirely
  - (If we take the time to write it, it is important that you read it.)
- Later projects take more time than early projects
  - Early projects give first-semester students time to adjust to CMU workload
  - If you are new to Unix and shell scripts, watch the suggested tutorials early

Course Staff Contact:

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