



18-642: Course Information

Fall 2024

<http://www.ece.cmu.edu/~ece642/>
ece642-staff@lists.andrew.cmu.edu

**Carnegie
Mellon
University**

Course Goals



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

■ 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**

■ 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

■ Attendance is required

- Make a point of attending the live class session
 - Attendance taken at every meeting
- If you have an excused conflict, instructor discussion in office hours within one week will count
- Poor attendance will affect your grade

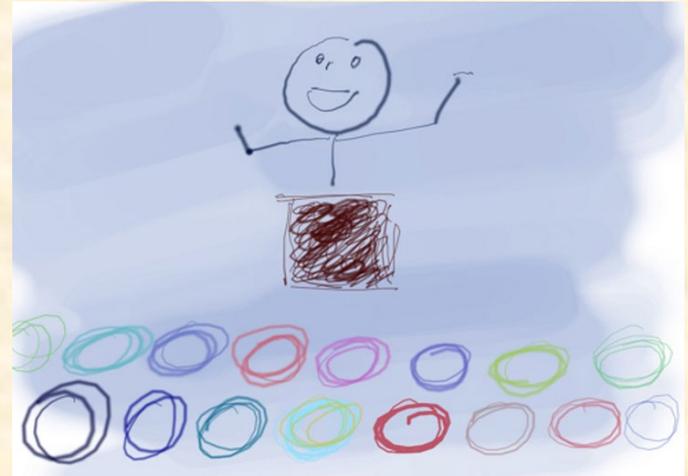
■ You'll make short homework presentations

- Mixture of live vs. pre-recorded
- Typical presentation is 60 – 90 seconds long
 - Concentrate on briefly getting the important points across

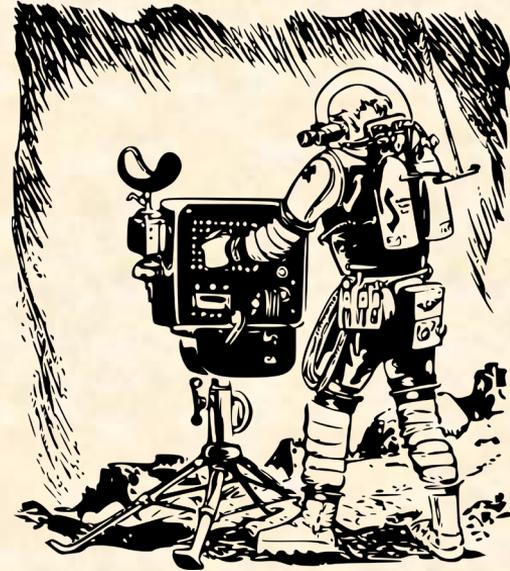
■ These are low-stakes presentations

- 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>



- 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

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 2024 Lecture Date	Lect. #	Lecture Slides For reference	Video Lectures Due on Wednesday night	Homeworks Due on Following Monday Night	Group Exercise Due on Following Wednesday Night	Project Due on Following Friday Night
Monday 26-Aug-2023		Classes Start	Project 1 intro video is playable on Canvas assignment page.			Proj #1 (Startup) Due Fri 30-Aug-2024
Thursday 29-Aug-2023 <i>Week 1</i>	1	Course Topics Overview	Embedded Software Code Quality, Safety, Security (44 min)	HW #01 Self Intro (DUE Wed 28-Aug-2024)		Proj #2 (Initial Cleanup) Due Fri 6-Sep-2024
	2	Admin Info	Course Overview & Administrative Matters (Video on Canvas only) (40 min)	HW #02 Computer Safety Literacy Stories; slide & video (DUE Tue 3-Sep-2024)		
	3	SW Process	SW Process (49 min)	HW #03 Software Process Due Wed 11-Sep-2024		
	128	Autonomous Vehicles and Software Safety Engineering	Autonomous Vehicles and Software Safety Engineering (41 min)			
	120	OPTIONAL Overview of Automated Vehicle Terminology and J3016 Levels (No quiz on Canvas)	OPTIONAL AV: Overview of Automated Vehicle Terminology and J3016 Levels (20 min)			
	Live:	Discuss: Q&A on course policy & content	In-class video on self-driving cars	Discuss: Self-intro Part 1 (HW #1)	Fill out weekly survey after class each week.	
Mon 2-Sep		Labor Day No office hours				
Thu 8-Sep <i>Week 2</i>	4	Code Style for Humans	Code Style for Humans (15 min)			Proj #3 (Code Style) Due 13-Sep-2024
	5	Code Style for Compilers	Code Style for Compilers (21 min)			
	6	Peer Reviews	Peer Reviews (33 min)		GP Ex #06 Peer Review Exercise	
	7	Spaghetti Code	Spaghetti (18 min)	HW #7 Spaghetti Code (Normal due date: Monday 9-Sep-2024)		
	Live:	Guest: 6:00 PM:	Finish Self-Intro/Peer Review Exercise			

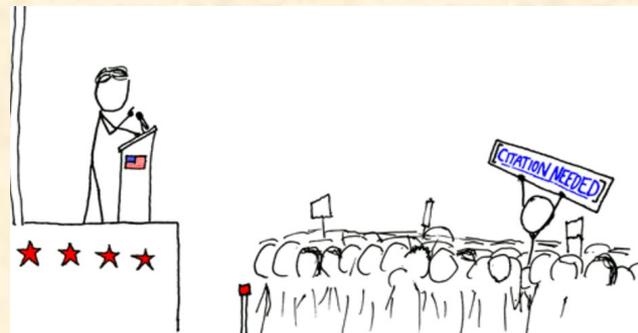
Academic Integrity Overview

■ 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

- 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

- **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.

■ 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.

[DALI-2]



No.

< 1/3



No.

< 2/3



No.

< 3/3



Unknown

< 4/4 >



Cannot determine.

< 5/5 >



No.

< 6/6 >

[ChatGPT]



■ 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

- 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
 - Clean up after yourself -- leave classroom clean
 - On-line meetings: mute microphone unless you're speaking
 - If you need to eat dinner during class that is OK
- 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

- 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

- 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 (#20, #40)
 - One slide per lecture. Good idea to do these as you do lectures
 - Treat these seriously. They are REQUIRED instead of a mid term + final exam.
- Check announcements daily (better yet, subscribe to e-mail alerts)
 - 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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