EEP 520: Software Engineering for Embedded Applications

Summary:

In this course, we introduce the fundamentals of programming languages and software engineering common to all levels of embedded systems programming, giving students the conceptual tools they need to tackle various projects.

- **Instructor:**
    - **Sep Makhsous**, sosper30@uw.edu
        - **Office hours:** After the class or by appointment
- **TAs:**
    - **Armagan Er**
    - **Winston Sun**
- **TA Office Hours**
    - link

Main Communication Platform: Slack Link (This is mandatory for all students): CLICK HERE

Class Meetings Information:

- **Class Time and Location:**
    - MW 4:30p - 6:20p. JHN 175

Grading policy:

- Homework: 50%
- ICTEs: 20%
- Final Project: 30%
- Bonus: 5%

Class format:

The class will be held in person. It is important that you attend the class meetings to increase your learning experience, especially during In-Class Team Exercises (ICTE) (more info below). We will provide, prefilled slides, recorded lectures, and filled-out notes for you to review

asynchronously. We will also provide a zoom option for those who can not make it in person; however, this is not a hybrid course, hence, the engagement through zoom will be limited. If you are joining the class remotely, you will need to make sure to collaborate with your team during ICTEs to receive full credit.

Overview

Learning Outcomes [LO]

- Design an embedded application for small and moderately sized problems
- Implement a given design in the C/C++ programming language
- Generate appropriate documentation for developed solutions
- Design and implement tests for a given component
- Explore existing documentation to describe and use existing libraries and frameworks

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Course materials

We will provide lecture notes, homework assignments, and other materials using Canvas Home Page,

Here is a summary of all the course material:

- **Prefilled slides:** will be posted 12 hours prior to the lecture
- **ICTEs:** will be posted during the lecture and will be due by the end of class time
- **HW:** will be posted at least 2 weeks prior to the deadline and will be due on Saturday at midnight
- **Filled-out Lectures and Recordings:** will be posted 12 hours after the lecture

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Course Resources

- The Elma process manager
- We will be using GitHub for version control of all of our code
- Please use Visual Studio Code to edit your code for this course

- Google Test unit testing environment
- Docker container creation and management system
- C++ language documentation
- Doxygen API documentation generator

Homework

See the Canvas home page for homework assignments and deadlines.

Workload: ***there will be 6 homework assignments*** posted and submitted in electronic form as a .pdf on Canvas.

In-Class Team Exercises (ICTE)

Will be published on Canvas for the second part of the lecture. ICETs are in-class assignments done in groups and submitted by the end of class. The lowest score drops.

Workload: ***there will be approximately 4-6 ICETs during the course.***

Final Project

Demonstrating the use of topics covered in class. Your final project will be done individually.

Collaboration guidelines

Done in teams: ICTEs - teams of 2

Done Individually: Homework assignments, Bonus Problems, and Final Project.

In addition, you are welcome (and encouraged) to:

- work together, synchronously and asynchronously, in study groups;
- use analytical and numerical computational tools -- specify the tool(s) in source code and/or text;
- reuse example source code and other materials provided in this course;

- consult textbooks, websites, and other publicly-available materials -- include a full citation(s) with the URL and/or DOI (Links to an external site.).

Submission guidelines

You will submit your homework write-up by uploading a .pdf on the Canvas Assignment. **We will only grade legible .pdf files -- we will not grade content in any other file format (.doc, .zip, .ipynb, .m, ...).**

If you write your solutions by hand, you must create a legible scan; if you have any doubts about the fidelity of your scans, send a sample to the instruction team in advance of the homework deadline.

http://www.howtogeek.com/209951/the-best-ways-to-scan-a-document-using-your-phone-or-tablet/ (Links to an external site.)

Due dates and extensions

Due date: ***homework assignments are due by 11:59 p.m. Saturday.*** Submitting by this deadline will provide +5% bonus points

Extensions: ***everyone automatically receives an extension with no penalty*** on homework to midnight (11:59p) on Saturday immediately following the due date. Due to the fact that we will release solutions on Monday morning, **no further extensions will be considered -- please plan accordingly**.

Rationale: we want to incentivize you to start (or at least review) assignments/exams and to make use of scheduled class meeting times -- thus, the nominal due date is 11:59p Sat. However, we don't want to penalize you if other aspects of your professional or personal life take priority in any given week -- thus, the actual due date is 11:59p Sun.

Grade

As described above, the final grade will be determined from:

- Homework: 50%
- ICTEs: 20%
- Final Project: 30%
- Bonus: 5%

- **Total: 105%**

Canvas and Slack

We will use Canvas (i.e. this site) extensively for course materials and **Slack for all communications.**

The instruction team will provide homework, example code, etc. through Canvas; you will submit homework electronically through Canvas as described above.

If you have a question -- about a concept, HW problem, etc. -- it's likely someone else in the class does as well. **Please use our Slack channel to post questions (rather than emailing or messaging the instruction team directly) so that (a) others get to propose answers and (b) others get to see the definitive answer (if any).** If you send questions via email to the instruction team, we will direct you to ask it on Slack so others can benefit from our answers.

If you are unfamiliar with Canvas, here are some links to help you get started:

https://www.tacoma.uw.edu/canvas/getting-startedLinks to an external site.

https://www.tacoma.uw.edu/canvas/how-do-iLinks to an external site.

https://community.canvaslms.com/community/answers/guides/ (Links to an external site.)

Learning Environment and Professional Conduct

This classroom is a respectful, inclusive environment welcoming students of all backgrounds, identities, and abilities. All members of the course are expected to contribute to a supportive learning community.

Disability and access accommodations

Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but are not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are

welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu (Links to an external site.). DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Religious accommodations

Effective July 28, 2019, Washington State Senate Bill 5166 (Links to an external site.) required that UW develop a policy for the accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. I am proud that my UW ECE colleague Rania HusseinLinks to an external site. contributed to drafting and promoting this legislation.

The UW's policy, including more information about how to request accommodation, is available at Faculty Syllabus Guidelines and Resources (Links to an external site.). Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form available at: https://registrar.washington.edu/students/religious-accommodations-request/ (Links to an external site.)

Safety

Call SafeCampus at 206-685-7233 anytime – no matter where you work or study – to anonymously discuss safety and well-being concerns for yourself or others. SafeCampus's team of caring professionals will provide individualized support while discussing short- and long-term solutions and connecting you with additional resources when requested.

Academic misconduct

Engineering is a profession demanding a high level of personal honesty, integrity, and responsibility. Therefore, it is essential that engineering students, in fulfillment of their academic requirements and in preparation to enter the engineering profession, shall adhere to the University of Washington's Student Code of Conduct (Links to an external site.).

Any student in this course suspected of academic misconduct (e.g., cheating, plagiarism, or falsification) will be reported to the College of Engineering Dean's Office and the University's Office of Community Standards and Student conduct. (See CoE website (Links to an external

site.) for a more detailed explanation of the academic misconduct adjudication process). Any student found to have committed academic misconduct will receive a 0 grade on impacted academic work (e.g., assignments, projects, or exams).

Credits: the structure of this syllabus is created by Prof Sam Burden.