Course Syllabus and Outline

Course: CPEN 291 (*Computer Engineering Design Studio I*), 2021W2

Course description from the UBC calendar:
Design projects involving hardware (electronic devices and circuits, microcomputers) and software.

Course Instructor: Dr. Farshid Agharebparast
Contact: **farshid@ece.ubc.ca (mailto:farshid@ece.ubc.ca)** (Please use a descriptive email subject that includes CPEN291)
Office: KAIS 3045
Office hours: Updates to office hours will be announced on Canvas.

First two weeks of classes: As per UBC announcement, all classes and labs will be online till Jan 23. The usual course class times are used for virtual live lectures. See announcement on Canvas for details.

- Arrive on time: Join the session a few minutes before the start time, to ensure that your Internet connection, webcam, and microphone are functioning properly.
- Mute your Mic: By default, mute your microphone as it may pick up on background noises which can distract other participants. Only unmute during the time that you are to speak.
- Use the "Raise Hand" Feature: Anytime you would like to speak or ask a question, make your intentions known to the moderator. This is to allow me to answer all questions efficiently. Remember to "lower hand" once you have spoken.
- Find a quiet area and minimize any audio distractions (notifications, phones, ...)

The software tools needed are open-source and can be easily installed on your computer (Windows, macOS or Linux).

All times/dates used in the course are Vancouver time (that is, PST).

Course description:
This design studio course is an introductory and somewhat self-contained laboratory course on computer engineering concepts and skills. The course provides the settings to learn, practice and master good software design, hardware design and implementation practices and to synthesize and apply material from several core 200-level courses. It covers many aspects of the dynamic field of computer engineering, in particular:

- Program design and programming languages (Python, Web, …); testing; GUI; version control;
- Embedded computing systems, and physical and cyber-physical systems;
- Web development, frontend and backend; Use of modern Internet technologies;
- Machine learning applications;
- Transducers; robotics; electronic devices and circuits;
- Relevant open-source software and OS, Linux, git, CAD, fritzing, …

- Soft skills: group work and group dynamics, technical communications, design and creativity, professionalism.
- ...

The key high-level learning outcomes are:

- To synthesize foundational computer engineering knowledge base including electronic circuits, microcomputers and software systems.
- To identify and apply suitable design strategies for open-ended engineering problems.
- To evaluate the suitability of a design solution for a given engineering problem in the context of foundational material.
- To demonstrate an ability to communicate design decisions in writing and in other forms including oral presentations or demos.
- To identify potential safety issues and to include suitable precautions in the design and operational process.
- To develop the ability to work in small teams.

Class times and Locations:
Lectures: Wed 15:00-17:00 AM, **LIFE 2201**
(https://ssc.adm.ubc.ca/classroomservices/function/viewlocation?
userEvent=ShowLocation&buildingID=LIFE&roomID=2201)
Section L2A Labs: Wed/Fri 8:00-11:00 PM, **LIFE 2602**
(https://ssc.adm.ubc.ca/classroomservices/function/viewlocation?
userEvent=ShowLocation&buildingID=LIFE&roomID=2602)
Section L2B Labs: Tue/Thur 8:00-11:00 PM, **LIFE 2602**
(https://ssc.adm.ubc.ca/classroomservices/function/viewlocation?
userEvent=ShowLocation&buildingID=LIFE&roomID=2602)

Each group will be assigned fixed lab benches throughout the course in LIFE 2602.

The schedule for labs will be posted on Canvas.

Some important dates from the UBC calendar (please do double-check):
* Last day for change in registration without W standing: January 21
* Last day for change in registration with W standing: March 4
* Midterm break: February 21 to 25 (midterm break)
* Last day of classes: April 8

Workload:

Class Activities:	10%	(quizzes and participatory activities to enhance learning)
Labs:	24%	(tentatively 4 labs)
Projects:	66%	(tentatively 2 projects)

Please note that:
* This is a design studio course (software and hardware). Careful attention to the proper design process is important.
* You must also pass the project portion of the course to pass the course. If one fails to satisfy

any requirement to pass the course, a final grade of no greater than 45% will be assigned.

* Deliverables include file submissions to Canvas (code, schematic, and report), demos, tests, safety training quiz, or other such evaluations. Any evaluation will be associated with one of the above coursework component.

* Marks are dedicated to engineering design considerations, implementation (coding and product), final products, documentation, safety, professionalism, use of software, and other relevant considerations in software and hardware.

* All work must be handed in by the designated deadline. No late submission is accepted. Please plan ahead.

*iPeer is used for peer evaluations for most group work. It is considered as one of the assessment points considered for evaluating individual contributions and assigning individual grades.

* For most group work, GitHub's course repositories are used as one of the assessment points considered by the instructor for evaluating individual contributions and assigning individual grades.

* Schedule for labs, projects, assignments, quizzes, tutorial … will be posted on Canvas.

* There will be individual and group-based evaluations. For group-based activities, equal contribution and knowledge gain by each student is essential. The course instructor may examine any student individually regarding the understanding and contributions to group experiments, projects or course concepts.

* In addition to the class activities quizzes, quizzes on any of the course concept (e.g. programming, hardware, implementation, design …) may be scheduled. The quiz mark will be a part of a relevant course workload, and will be announced before the quiz.

* The grade of A+ is reserved for excellent design, and additional implementations and considerations.

* If and whenever you reasonably use an external source for any work you submit, you must give proper attribution (fully disclose and reference the source). In particular, if the lab/project description says *implement X*, then you must create your own *X*. Your group may not reuse designs, ideas, or code created by another group, in this semester or previous semesters, or elsewhere.

* For the external tools used in the course (such as github, google colab, …), for your privacy, do not include personal info. We can identify you for example from your github id. All final submission are to be to Canvas.

* This is the tentative grading scheme. It is subject to change, if deemed necessary by the instructor.

Safety Policies and Laboratory Rules: Paying careful attention to safety and professionalism is paramount in this course. You must know, review, and follow all safety rules and guidelines.

See the ECE departmental policy at **http://ece.ubc.ca/safetypolicy (http://ece.ubc.ca/safetypolicy)**
"Unprofessional conduct that violates safety policies or posted laboratory rules can result in significant penalties that include loss of access to departmental facilities and/or a reduction in grades in accordance with the departmental policy on safety and professionalism in laboratories."

Attendance: Per UBC policies (**http://www.calendar.ubc.ca/vancouver/index.cfm?
tree=3,36,0,0**   **(http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,36,0,0)**) regular
attendance is mandatory. You must attempt and attend each lab and project to be eligible to pass
the course. Attendance will be recorded at the beginning of the lab times, as well as during in-lab
demos, quizzes …

Canvas: All course materials will be on Canvas including: announcements, lab instructions,
lecture notes, submissions dropboxes, grades … You are expected to check the Announcements
regularly for important updates.

Groups: Groups of four students are formed who will work together on the many course activities
throughout the term. Each group will purchase a course kit, and will submit/demo together for the
group activities. Code review and design review is expected of every student (overall and your
other group-mates code) before submitting for evaluation. Everybody must equally participate,
cooperate and coordinate in all labs and projects, and contribute a roughly equal share to design
and implementation. You should designate a leader for every experiment. You should rotate this
responsibility among members. There will also be some individual evaluations.

Git and Github: Git and Github are important version control and team work tools. It is required
that each student use git and github to record individual software work that is contributed to most
group work, by regularly committing to the provided github repository. Of course, some portion of
individual contribution may be for hardware development.

Course component kit: Each group purchases a component kit. The kit includes many
components needed for some labs and the basic requirements of some projects. For additional
functionalities or open-ended projects for which each group will make decisions unique to the
group, you may need to purchase whatever additional components you plan to use later
yourselves (more info later; this depends on your design and project). See Canvas for the list of
the components in the lab kit, how to purchase it, what it covers, where to purchase additional
components, tools…

Discussion board: Online discussion boards are solely for academic discussions. You must be
professional, courteous and fully follow the rules. All questions related to grades or personal
matters must be communicated with the instructor via email. The violator's access will be
revoked, subject to further investigations. See the course's Canvas for more info.

Missed Evaluations: The course instructor must be notified as soon as possible and within 48
hours of a missed evaluation (such as project demos or tests) due to medical emergencies.

If one misses an evaluation due to some unforeseeable emergency, provided that adequate
documentation is submitted to and accepted by the instructor, one must discuss with the instructor
for the possibility of other grading arrangements (such as arranging for a make-up exam or carry
forward …) as soon as possible.

Textbook (optional): There is no textbook to purchase for this course. The course covers a
diverse set of skills and concepts related to the second year computer engineering curriculum. In

addition to the textbooks for your 2nd year core courses, there are many other good books and online resources.

There are many reputable online resources and optional books that can be used as references for this course. In particular:

- **https://www.python.org/doc/** **(https://www.python.org/doc/)**
- **https://docs.anaconda.com/** **(https://docs.anaconda.com/)**
- **https://circuitpython.readthedocs.io/en/latest/README.html** **(https://circuitpython.readthedocs.io/en/latest/README.html)**
- **https://www.w3schools.com/** **(https://www.w3schools.com/)**
- *Encyclopedia of Electronic Components Volume 3* by C. Platt and F. Jansson,
- *Introduction to programming using Python* by Y. D. Liang
- …

Succeeding in CPEN 291:

- Attend all labs and lectures, and enjoy! This is a fun and practical course.
- Prepare for each lab beforehand.
- Submit/demo work (reports, codes, …) on time. No late submission is allowed.
- Be a team player and communicate efficiently with your teammates.
- Expect fair effort and equal contribution from all group members.
- Learn from each other in a group.
- Work individually to completely learn/understand the practical and theoretical concepts. Do not be contented with the bare minimum.
- Actively participate in course/lab activities and ask questions.
- Read often, implement often, program often, test often …

UBC student success resources: "UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty and students ae expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions." Details of the policies and how to access support are available at **https://senate.ubc.ca/policies-resources-support-student-success** **(https://senate.ubc.ca/policies-resources-support-student-success)**

UBC Policies:

Academic honesty and integrity : "The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the

breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences."

Link to the relevant Calendar section: **http://www.calendar.ubc.ca/vancouver/index.cfm? tree=3,286,0,0** **(http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,286,0,0)**

Acceptable conduct: "Students are responsible for informing themselves of the guidelines of acceptable and non-acceptable conduct for graded assignments established by their instructors for specific courses and of the examples of academic misconduct set out below …" Read more at **http://www.calendar.ubc.ca/vancouver/?tree=3,54,111,959** **(http://www.calendar.ubc.ca/vancouver/?tree=3,54,111,959)**