SYDE 461/462 – Systems Design Workshops 2&3
Fourth Year Design Project - FYDP
Course Syllabus
Fall 2022/Winter 2023

Course Meetings (Laboratory/Design Reviews):

Fall 2022: Friday 9:30-11:20am, Virtual with support through MS Teams
* Panel exams will possibly be booked at other times, in coordination with the team and your project advisors.

Winter 2023: TBD

Instructors:
- Prof. Reem Roufail, PEng., Systems Design Engineering
    - rroufail@uwaterloo.ca
- Prof. Matt Borland, EIT, Systems Design Engineering
    - mjborlan@uwaterloo.ca
- Engineering Support: Orion Bruckman, orion.bruckman@uwaterloo.ca
- TA: TBD

Contact:
We are always available to help you with your projects, so feel free to contact us via email to set up a meeting. Friday mornings will generally be used for info sessions and student support, 9:30-11:20am. MS-Teams will also be used for video calls or chats and will be monitored for questions and other communications as well. We can also be available at other times, as well - just email and set a meeting.

Course Website:
461 and 462 will be delivered using UW-LEARN - http://learn.uwaterloo.ca (Login with Quest ID and password).
The course website will provide:
- informational materials (e.g., deliverable instructions, resource materials, course updates, course contacts)
- electronic drop boxes for course deliverable submissions

Always feel free to book a meeting outside of regular meeting times - we're here to help!

Course Communications:

To facilitate timely and accurate communication we will use both text and video-conferencing communication:

- For lecture, project, or general course questions, post to the MS Teams channel or contact the instructor via email.
- For personal issues, use email or set up a video call with Prof. Roufail or Prof. Borland. They are always available to help, so get in touch to set up a meeting whenever necessary. There is also time scheduled into the Friday sessions for help.
- An MS Teams channel has been created for the course, but any official communications related to course content or deliverables will be posted on LEARN. Please act professionally and remember that the MS Teams channel must be considered an extension of the classroom. Any inappropriate posts or actions will be subject to academic discipline, just like in the classroom or on LEARN.

When communicating with fellow students or the course instructors you are expected to use professional practices, including respectful, clear messages, especially via email. See "Email Policy" section below for more on email communications.

Course Objectives:

The Canadian Engineering Accreditation Board (CEAB) requires that an engineering undergraduate curriculum culminate in a significant open-ended engineering design project which should involve teamwork and project management. The main goal of SYDE 461, along with SYDE 462, is to have 4th year SYDE students demonstrate appropriate competencies by applying engineering design knowledge and skills gained throughout the SYDE undergraduate program to a substantial engineering project that spans two terms (4A and 4B).

Learning Objectives:

- use advanced engineering tools and methods to inform design decisions and project outcomes (GA 5a, 5b, 5c)
- present design outcomes through oral, written, graphical, and physical communication mediums (GA 7a, 7b, 7c)
- provide insight into the social, environmental, and economic impact of your design solution (GA 8a, 8b, 9a, 9b)
- follow the iterative design process including needs assessment, design and analysis, and validation and testing of your designed solution (GA 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c)
- function as a competent team member including project management, communication, and professionalism (GA 6a, 6b, 11a)
- demonstrate independent learning as an indicator of a commitment to lifelong learning (GA 12a, 12b, 12c)

*see the end of this document for explanation of Graduate Attribute codes.

Overview of Project Expectations:
All design projects are expected to be substantial projects, at a suitable technical level for 4th year engineering students. To assist with completion of a sufficiently substantive and complex project, projects must be completed in teams of 4 students. This also facilitates fair and equitable grading across teams. Strong justification as to why a smaller or larger group is required must be submitted to Professor Borland for approval before the team can proceed with project planning. Note that submission of a justification is not in and of itself approval.

All projects are expected to include rigorous needs assessment, design, analysis, and evaluation activities, applying different engineering design methodologies as appropriate in each phase and iterating upon designed solutions (early and often!) throughout the project. Some projects may be more "applied"—that is, they apply or extend existing design solutions, in novel ways, to current real-world problems—while other projects may be more "research" oriented—that is, they focus on solving a more open-ended engineering design question, and will result in a less "consumer-ready" product by the end. However, ALL projects must produce a demonstrable, testable, engineering design outcome, rather than theoretical outcomes.

A testable, functional prototype must be demonstrated in 4A, and a robust, and strongly evaluated Design Solution must be demonstrated in 4B.

Policies on Required Coursework:

Late or Missed Course Deliverables and Milestones:
- 0% will be given for any late or missed course deliverables.
- Negative grades, as indicated in milestone instructions, will be applied to missed course milestones.
- The university's policy on reporting of illness should be followed. Make a good-faith attempt to report illness and use the self declaration of illness.
    - https://uwaterloo.ca/quest/help/students/how-do-i/self-declare-my-illness
    - email Prof. Roufail, Prof. Borland, and the SYDE Undergraduate Coordinator at the same time to keep us informed of the situation.
    - if possible, try to get a VOI form filled out following the university's guidelines
- No extensions will be given after a submission date. Extensions will only be given for very serious issues, and will only be considered for the following circumstances:
    - Domestic tragedy (notify Instructors as soon as possible of the situation)
    - Known conflict: Instructors must be notified before the assignment deadline, as early as possible. Proof of conflict is required.
- Marking of Team-Based Deliverables:
    - By default, marks for all team-based deliverables will be applied to all group members. However, the instructor reserves the right to assign individual students a fraction of the total group mark on any specific team-based deliverable without sufficient evidence of that student's contribution to the group effort. The onus is on each individual student to provide evidence of their individual contribution to the team effort.

- If a team feels that lack of effort by one or more group members is negatively impacting the group's ability to meet the progress or outcome expectations for the course, the situation MUST be identified to the course instructor PRIOR to any impacted deliverable to be considered for accommodation in deliverable grading. Otherwise, default grading criteria will be applied (e.g., project progress and outcomes will be assessed on the basis of a full 4-person effort). Group members must submit a written request for accommodation, PRIOR to the deliverable deadline, detailing the situation. Note that submission of an accommodation request is not in and of itself approval.
- It is the responsibility of ALL team members' to ensure the accuracy and quality of all aspects of submitted team-based deliverables. Therefore, any academic integrity offences arising from a team-based deliverable will impact ALL group members.

Estimated Weekly Course Commitment:
- 2 hours laboratory/design sessions (weekly)
- 7-10 hours design project (120 hours/person/term is expected over the course of the project)

The Faculty of Engineering expects students to spend 10-12 hours per week on a course (e.g. 3 hours lectures, 7-9 hours on course preparation, assignments, etc.). In SYDE 461, the main learning vehicle is a team-based design project. Class members must make a minimum commitment of 7-10 hours per week to the design project, over the 12 weeks of the course, and 2 hours for occasionally scheduled synchronous lectures (the schedule will be posted on LEARN). It is required that teams meet to work on the project at least 1 hour a week to discuss their project status, and also use the class times to meet or independently work on the project on weeks when no in-class activities are scheduled.

SYDE 461 Deliverables and Milestones and Associated Grades

NOTE: Due to the significant amount of group work required for the team deliverables, the instructor reserves the right to assign individual students a fraction of the total group mark on any specific team component without sufficient evidence of contribution to the group effort. Keeping an accurate Accountability Log is the best way to document your contributions.

SYDE 461 - F2022			
	Individual	**Team**	**Due Dates**
Advisor Agreement		-1% Penalty if not completed	Sept. 23, by 8pm ET on LEARN
Team Contract		-1% Penalty if not completed	Sept. 23, by 8pm ET on LEARN
Project Description		5 %	Sept. 23, by 8pm ET on LEARN
EAL Midterm - Optional Feedback	~	~	Oct. 7, by 8pm ET on LEARN
Conference Paper		10 %	Nov. 18, by 8pm ET on LEARN
Individual Contribution Document	50 %		Nov. 18, by 8pm ET on LEARN
Panel Exam - Slide Deck	~	~	Nov. 20, by 8pm ET on LEARN
Panel Exam - Group		10 %	Booked Nov. 20 to Dec. 2
Panel Exam - Individual	10 %		Booked Nov. 20 to Dec. 2
Prototype Submission + Safety and Ethics		5 %	Dec. 2, by 8pm ET on LEARN
EAL and Reflection	10 %		Dec. 6, by 8pm ET on LEARN
Total	**70 %**	**30 %**	

*GRADING NOTE: All course deliverables will be graded by the Course Coordinator, with input from Project Advisors and/or Examination Panelists. Grades will not be delayed due to delayed/missing input from Project Advisors. If an Advisor does not provide feedback by a specified deadline, then the grade will be assigned without their input.

**PANEL EXAM NOTE: ALL team members must be physically present at the SYDE 461 Panel Exam and the SYDE 462 Panel Exams. All team members are expected to answer basic questions about all aspects of the project.

Email Policy:

All course email should follow the following guidelines:
- All emails should be sent using your official UW email account.
- Address your email appropriately and be professional.
- Sign your email with your first and last name, and your student number. If you use a name different than your name as shown on QUEST, please include both.
- Allow 48-72 hours for a response to your email.
- Email should be used for brief questions that can be answered quickly. Please make an appointment to video-conference with Prof. Borland for detailed discussions/explanations.

Academic Integrity Policy:

It is expected that within this course, the highest standards of academic integrity will be maintained, in keeping with UW's Policy 71, "Student Academic Discipline Policy." While all aspects of Policy 71 apply to all UW courses, of particular relevance to SYDE 461/462, it is each student's responsibility to avoid:
- plagiarism, "which is the act of presenting the ideas, words or other intellectual property of another as one's own...properly acknowledged use of sources is an accepted and important part of scholarship" (UW Policy 71).
- misrepresentation, "lying, submitting or presenting false research...This includes, but is not limited to, actions such as: concocting research or lab results; misrepresenting the date or time of submission" (UW Policy 71).

In SYDE 461/462:
Sanctioned Collaboration vs. Individual Work
- Collaboration is allowed for in-class exercises and the team components of the design project.
- Individual components of the design project (e.g. accountability reports) must be an individual effort.
- Design project instructions will clearly identify individual and team components.

Accurate and Honest Reporting
- All submitted project reporting must include actual progress made on a project, actual testing done, and actual results generated based on data collected or appropriately simulated.
    - If your team did not get as far as expected with the design, be honest.
    - If your team was unable to complete (or start) proposed design validations, be honest.
    - If your team did testing but was unable to meet or exceed the specified benchmarks, be honest.

Under Policy 71, if a team submits a report that contains fraudulent information (including reports of tests conducted that have not been carried out, or data falsely generated) then the course instructor will have no option but to treat it as an academic offence. For team submissions, academic integrity investigations apply to all team members, as the team collectively submits the document. The same applies if fraudulent reporting is uncovered as

part of the questioning during any of the Project Panel Exams. Honesty is part of professional practice. It is not uncommon to have to explain and own up to why a project has not proceeded as planned. Being accountable and responsible for (team) decisions are also part of professional practice.

All referenced work in reports must be appropriately cited, including websites. If there are any questions whatsoever, feel free to contact the course instructor about any possible grey areas.

Students are strongly encouraged to review UW's Academic Integrity "For Students" webpage. www.uwaterloo.ca/academicintegrity

Course Requirements:

ALL SYDE-BME students are expected to complete and submit Individual Accountability Logs and related submissions, whether the student is enrolled in SYDE-BME 461/462 or GENE 403/404. This is a Department requirement for all SYDE-BME students enrolled in Capstone projects. Individual students can fail team-based projects if it is determined that the student has made insufficient meaningful, competent technical contributions to the project.

All SYDE-BME students are expected to participate in panel reviews through either SYDE-BME 461/462 or GENE 403/404.

All SYDE-BME students are expected to participate in Design Symposiums or other related demonstrations of work.

All SYDE-BME students are expected to be physically on-campus for any panel reviews, examinations, and demonstrations of work.

SYDE-BME COMMENT ON ATTENDANCE AND ACCOMMODATION:

We respect that our SYDE-BME students are independent adult decision-makers, with many opportunities to partake in activities that might be in time conflict with academic deadlines and deliverables. Students may self-elect to forgo attending class or deliverables for a variety of personal reasons (e.g. attend a co-op interview, celebration, conference, compete in a non-UW sanctioned event such as a pitch contest or extra-curricular, travel, etc.). Along with the right to make adult decisions comes the responsibility and accountability for those decisions and any outcomes.

The University of Waterloo's policy on accommodation for missed deliverables pertains to verifiable health matters, and highly unfortunate events (e.g. family tragedies). The Department of Systems Design Engineering follows UW's general policy: students who self-elect to be away during class time and/or deliverables receive a "0" for that deliverable. It is preferred practice so that fairness is maintained for members of the same class/course by avoiding preferential treatment, and so that instructors are not burdened with having to create

extra quizzes, deliverables, etc. It also reflects professional practice, as failing to show up to work and missing deadlines can be very costly to the company and individual (e.g. not submitting a contract proposal, or design review on time). Please read the policy here: http://ugradcalendar.uwaterloo.ca/page/Acad-Regs-Accommodations

SYDE-BME COMMENT ON CO-OP INTERVIEWS AND ACADEMIC DELIVERABLES:

Academic Deliverables are to take priority over co-op interviews. This is especially true for course midterms and final exams. Students who have been scheduled for an interview at the same time as a course test, midterm, or exam, MUST follow the CECA procedure for rescheduling the interview: https://uwaterloo.ca/co-operative-education/find-your-co-op-job/waterloos-co-op-process/interview-process/interview-process-and-procedures.

Compassionate Accommodation:

There are times when the Department will make compassionate accommodation for students experiencing circumstances beyond their control. When warranted, the Associate Chair Undergraduate (ACUG) and Director of BME coordinate a reasonable and fair plan in consultation with appropriate others (e.g. instructors, Department Undergraduate Studies Committee, Chair, AccessAbility Services, Engineering Counselling services, Registrar's Office).

Students: If you are going to be absent, let us know. We can help you interpret policy for your case; and help with coordination of reasonable accommodation if it is appropriate. If you have questions or concerns about accommodation, please speak to the Associate Chair Undergraduate (ACUG) or BME Director, as appropriate.

Institutional Requirements for Course Outline

Required Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check www.uwaterloo.ca/academicintegrity/ for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing academic offences and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Guiding Principles for our SYDE-BME Community (faculty, staff, and students):
1. Be compassionate. 2. Be accountable. 3. Be patient. 4. Be safe and healthy.

Compassionate and respectful communication: Most online communication between the Department and students will be done through LEARN and/or email. Students are reminded that they should now use their email account name@uwaterloo.ca. Include an academic signature with your full name, program, student ID. We encourage you to include your preferred pronouns (he/him; she/her; they/them).

Scheduling of Synchronous (live) online course events: Due to the COVID-19 pandemic, all University of Waterloo courses components will be delivered online, until further notice. To maintain build supportive teaching environments, instructors may use the time slots (EDT) scheduled "in-class" hours to hold "live-stream" events such as lectures, tutorial help sessions, group activities, and open office hours. To accommodate different time zones, different working/studying conditions and limitations in internet access, all critical course components, including lectures and student support must be made available in asynchronous formats. Any timed component (e.g. test/quiz) must take time zone and internet availability into account.

SYDE-BME COMMENT ON ACCOMMODATION: We respect that our SYDE-BME students are independent adult decision-makers, with many opportunities to partake in activities that might be in time conflict with academic deadlines and deliverables. Along with the right to make adult decisions comes the responsibility and accountability for those decisions and any outcomes.

The University of Waterloo's policy on accommodation for missed deliverables pertains to verifiable health matters, and highly unfortunate events (e.g. family tragedies). The Department of Systems Design Engineering follows UW's general policy: students who self-elect to forgo a deliverable receive a "0" for that deliverable. It is preferred practice so that fairness is maintained for members of the same class/course by avoiding preferential treatment, and so that instructors are not burdened with having to create extra quizzes, deliverables, etc. It also reflects professional practice, as failing to show up to work and missing deadlines can be very costly to the company and individual (e.g. not submitting a contract proposal, or design review on time). Please read the policy here: [Accommodation due to illness.](#)

SYDE-BME Academic Priorities over Co-op Interviews: With asynchronous schedules, students should be able to arrange co-op interviews that do not conflict with major deliverables (i.e. timed course midterms, final exams). For deliverables with longer time windows (e.g. 24-48 hours or more), students must manage their time for deliverables and co-op interviews accordingly. If a co-op interview conflicts with a short deliverable time window (e.g. 1-3 hours), then students MUST follow the CECA procedure for rescheduling the interview: [CECA rescheduling co-op interviews](#).

COVID Considerations for F2022

Fair Contingencies for Emergency Remote Teaching

We are facing unusual and challenging times. The syllabus presents the instructor's intentions for course assessments, their weights, and due dates in Fall 2022. As best as possible, we will keep to the specified assessments, weights, and dates. To provide contingency for unforeseen circumstances, the instructor reserves the right to modify course topics and/or assessments and/or weight and/or deadlines with due and fair notice to students. In the event of such challenges, the instructor will work with the Department/Faculty to find reasonable and fair solutions that respect rights and workloads of students, staff, and faculty.

Course Format
When in-person teaching is possible it will be a combination of in-person lectures and hands-on activities.

Covid-19 Emergency Remote Teaching-Learning Contingency for In-Class Sessions
Live Support Sessions (not lectures) will be held on MS Teams for SYDE461, during scheduled course time on Fridays. During remote teaching situations all content will be delivered asynchronously via LEARN.

Covid-19 Emergency Remote Teaching-Learning Contingency for Assessments.
All course assessments are project based and won't be affected by remote learning. If access/resource limitations affect the projects' deliveries adjustments to expectations will be clearly communicated.

Covid-19 Emergency Self-Isolation.
If you are unable to attend a session or meet a deliverable deadline, please let Prof. Borland know immediately. If you are facing challenges that are affecting more than one course, please contact your Associate Chair or Director of your program. They will review your case and coordinate a reasonable and fair plan in consultation with appropriate others (for example: instructors, Department Undergraduate Studies Committee, Chair, AccessAbility Services, Engineering Counselling services, Registrar's Office).

Graduate Attribute codes:

- 2a. Formulate a problem statement
- 2b. Develop models to solve engineering problems including identifying approximations, assumptions, and constraints
- 2c. Critically evaluate solutions of engineering problems
- 3a. Design experiments to investigate complex engineering problems
- 3b. Gather information from relevant sources to address complex engineering problems
- 3c. Synthesize information from multiple sources to reach valid conclusions
- 4a. Define design requirements and specifications for complex, open-ended engineering problems
- 4b. Generate and refine potential solutions to complex, open-ended design problems
- 4c. Critically evaluate and compare design choices
- 5a. Select appropriate engineering tools, considering their limitations
- 5b. Create and/or modify appropriate engineering tools, identifying their limitations
- 5c. Use engineering tools appropriately
- 6a. Contribute as an active team member or leader to complete individual tasks
- 6b. Collaborate with others to complete tasks effectively as a team
- 7a. Generate appropriate documentation to communicate within the profession and to society at large
- 7b. Orally present information within the profession and to society at large
- 7c. Interpret information, including instructions
- 8a. Articulate the roles and responsibilities of the professional engineer in society with reference to the protection of the public and its interest
- 8b. Describe the importance of codes, standards, best practices, laws, and regulations within engineering
- 9a. Identify the relevance of and uncertainty associated with the different aspects (social, cultural, economic, health, safety, legal, environmental) of an engineering project
- 9b. Analyze the social, health, safety, and environmental aspects of an engineering project, incorporating sustainability considerations in making decisions
- 11a. Apply project management techniques in engineering projects, with attention to risk, and change
- 12a. Identify gaps in their knowledge, skills and abilities
- 12b. Obtain and evaluate information or training from appropriate sources
- 12c. Reflect on the use of information or training obtained