ChE 383, ChE 482, and ChE 483

During the capstone courses there will be four phases and you will work on:

- **ChE 383: Phase I, Initiation phase of the project;**
- **ChE 383, and ChE 482: Phase II, Planning phase of the project;**
- ChE 482, ChE 483: Phase III, Execution and Control Phase of the project;
- ChE 483 : Phase IV, Closing phase of the project.

CHE 383 –
Chemical Engineering Design Workshop

- Course Meetings: Scheduled class times (Wednesday 9:30 to 11:20 AM) will be used for lectures, workshops (E6-2024) and group/individual meetings. Content will be posted on UW LEARN for each step in the course.

- We are going to have 6 workshops. The first 5 workshops will be the materials used for the three assignments you will have to complete.

Who are we?

- **Instructor:**

Eric Croiset, Ph.D., P.Eng.
Office: E6-3020
Email: I check my e-mail (ecroiset@uwaterloo.ca) daily and try to respond in a reasonable amount of time

Course Introduction & Overview

- What is Engineering?

  Problem Solving: fundamental activity in engineering
- Why this course?
  - Enhance Problem Solving skills
  - Enhance Design Engineering skills
  - Broaden Chemical Engineering Design skills (Environmental, Safety, and Project Execution)
  - Get started on your CAPSTONE group projects

Course Introduction & Overview

- An introduction to the engineering design process, including problem definition and needs analysis, critical analysis of problems, alternative solutions, process synthesis, design constraints, and safety and environmental protection in design.
- This course also develops and enhances teamwork, project management and technical communication (written and oral).

Course Introduction & Overview

- Students in teams work on open-ended problems and apply the formal methods of engineering design.
- At the conclusion of this course, each student team presents a pre-proposal of the design project that will become the subject of CHE 482 and CHE 483.

Course Objective

- The main objective of ChE 383 is to help you define a design problem. Later in ChE 482 develop main and alternative solutions and begin to execute that plan. Therefore, in ChE 483, you will not be surprised in February and March when you are asked to start preparing posters and presentations showing the finished project!

- Please note that you are required to propose a *design* problem and not a *research* problem (although research may be conducted in the context of solving the design problem). If you are unsure whether your project constitutes design or research, you are encouraged to seek advice from the instructor….

Intended Learning Outcome

- Describe the engineering design process [1,4*]
- Develop a problem statement and specification for a design problem by performing a needs analysis [4]
- Identify relevant economic, social, health, safety, legal, and cultural aspects of a design problem [9]
- Generate and screen potential design solutions using appropriate methods [4]

* **CEAB Graduate Attributes**

CEAB stands for Canadian Engineering and Accreditation Board

Intended Learning Outcome

- Produce a plan for completion of a significant team project [3,4,5,6,7,11*]
- Work effectively on a team to establish roles and expectations [6]
- Present a design project proposal in written and oral format [4,7]
- Accept and provide technical feedback through peer review [4,12]

* **CEAB Graduate Attributes**

CEAB Attributes

1. Engineering knowledge base
2. Problem analysis
3. Investigation
4. Design
5. Use of engineering tools
6. Individual & teamwork
7. Communication skills
8. Professionalism
9. Impact of engineering on society & environment
10. Ethics and equity
11. Economics & project management
12. Life-long learning

Activities

- Workshops: Materials provided on UW LEARN,
  In-person sessions.
- Individual progress meetings: In-Person (if needed, online via MS TEAMS).

Course Assessment

Assignments (PDF, LEARN drop-box)	45%
Oral presentation (MP4 format, LEARN dropbox)	15%
Technical peer review (PDF, LEARN dropbox)	10%
Written proposal (PDF, LEARN dropbox)	30%

Schedule (Tentative)

Week	Date	Topics	Deliverables	Weight
1	Jan 8-12	Introductory Session		
2	Jan 15-19	Introduction to design, Needs Findings, Problem Statement (WS 1)	Sign up for assignment group on Learn (Friday)	0%
3	Jan 22-26	Problem specifications (WS 2)		
4	Jan 29-Feb 2	Solutions generation + potential solutions screening (WS 3)	Assignment 1 (Friday)	15%
5	Feb 5-9	Capstone project Identification and Impact (WS 4)		
-	Feb 12-16	Project Management and Communication (WS 5)	Assignment 2 (Friday)	15%
6	Feb 19-23	READING WEEK		
7	Feb 26-Mar 1	Conflict Resolution (WS 6) Teamwork Clinic (?)		
8	Mar 6-10	Nothing	Assignment 3 (Friday)	15%
9	Mar 11-15	Formal progress meeting		
10	Mar 18-22	Formal progress meeting	*Capstone symposium Mar 22*	
11	Mar 25-29	"Optional" progress meetings	Oral Presentation, Pre- recorded: MP4) (Friday)	15%
12	Apr 1-5	"Optional" progress meetings	Peer review (Friday)	10%
-	Apr 15	(During final exam period)	Written proposal (Wednesday)	30%

Deliverables: Due 11:59pm and usually on Fridays (except when indicated otherwise)

Engineering Design

- What is it?
  - The (engineering) designing process is one of working with others to **solve complex open-ended and often ill-structured problems** and **synthesize a specification of the function, form, behaviour, performance, manufacture, operation, maintenance**, and **disposal of a technological artefact (an element, system, or process**), such that the artefact's use promotes a preferred situation addressing identifiable objectives and constraints in a given **technological, environmental, health and safety, economic, corporate, societal, political, and cultural context.**

(Canadian Design Engineering Network)

Engineering Design

– "Engineering design is the process of **devising a system, component, or process to meet desired needs**. It is a **decision-making process** (often iterative), in which the **basic sciences, mathematics, and engineering sciences** are **applied** to convert resources optimally to **meet a stated objective**."

(From ABET, Accreditation Board for Engineering and Technology, the U.S. equivalent of CEAB).

Group Design Projects

- A requirement of the Canadian Engineering Accreditation Board (CEAB)
- An opportunity to develop, enhance, and demonstrate the 12 CEAB engineering graduate attributes…

Group work

- Expected to schedule your own Group meetings and work times
- May be useful to designate a Group Manager?
- Recommended set up a TEAMS, Dropbox or Google Drive (etc.) shared space for documents, resources?

Last note:

Please finalize the selection of your group members by Friday January 19, 2024 on LEARN (Groups Info) or at the following link:

https://docs.google.com/spreadsheets/d/17TMr7H_5_3_OyyOwM9kGQAVu2sZUc_MCwcLSDJut4hk/edit?usp=sharing