

ChE 383 – Chemical Engineering Design Workshop

1 General Information

Instructor: Eric Croiset, ecroiset@uwaterloo.ca, E6-3020

Lecture times: Mondays 9:30-11:20am, E6 2024 (used for workshops, group and individual meetings)

Notes: the course is workshop-based. Most weeks, on Wednesdays, materials will be posted on UW LEARN. We will have a short summary and discussions on Mondays if you had any questions, followed by time for you to start on the workshop for that week (During scheduled class time)

Office hours: By appointment, in-person or video calling through MS TEAMS

Course weight: Please, note that this is a 0.25 weight course (i.e., half the weight of a typical course)

Course website: learn.uwaterloo.ca

2 Learning Outcomes

2.1 Intended Learning Outcomes

At the end of this course a successful student should be able to:

1. Describe the engineering design process [1,4]
2. Develop a problem statement and specification for a design problem by performing a needs analysis [4]
3. Identify relevant economic, social, health, safety, legal, and cultural aspects of a design problem [9]
4. Generate and screen potential design solutions using appropriate methods [4]
5. Produce a plan for completion of a significant team project [3,4,5,6,7,11]
6. Work effectively on a team to establish roles and expectations [6]
7. Present a design project proposal in written and oral format [4,7]
8. Accept and provide technical feedback through peer review [4,12]

2.2 Calendar Description

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 team work, project management and technical communication (written and oral). 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. [Offered: F, W]

Prereq: 3B Chemical Engineering

3 Grading Scheme

Assignment	45%
Oral Presentation	15%
Technical Peer Review	10%
Written Proposal	30%

Notes:

- There are no examinations in this course.
- The written proposal will be due during the final examination period.



Important note: a satisfactory final oral presentation and written proposal is required in order to pass this course, otherwise a grade of incomplete (INC) will be awarded.

4 Schedule

The following tentative schedule is provided. This is subject to adjustment during the term:

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)

5 Mental Health and Wellness

University can be a rewarding and challenging environment. At times you may feel overwhelmed, stressed, anxious, demotivated, or depressed. Counselling services offers individual, group and peer support counselling, seminars and workshops aimed to facilitate personal and social growth, assist with life difficulties and intervene in times of crisis (<https://uwaterloo.ca/counselling-services/>).

6 Note for Students with Disabilities

AccessAbility Services, located in the Needles Hall extension, 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.

7 Intellectual Property

Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:

- a. Lecture content, spoken and written (and any audio/video recording thereof);
- b. Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
- c. Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
- d. Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

8 Expectations of 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. More information available at: <http://www.uwaterloo.ca/academicintegrity/>.

Discipline: Academic offences will not be tolerated. Every student is expected to know what constitutes academic integrity to avoid committing an academic offence and to take responsibility for his/her actions. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline:

(<https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-71>)

For typical penalties, please refer to the Guidelines for the Assessment of Penalties

(<http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines>).

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

(<https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-70>).

When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

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

(<https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-72>).

9 CEAB Graduate Attributes

The [Canadian Engineering Accreditation Board \(CEAB\)](https://www.engineerscanada.ca/accreditation/accreditation-resources) is responsible for the accreditation of all engineering programs in Canada. An accredited program is one that meets or exceeds the educational standard appropriate for professional accreditation in Canada. One of the requirements for accreditation is to demonstrate that graduates from the program possess a set of twelve “Graduate Attributes”, which are listed below with their CEAB definitions.

1. **A knowledge base for engineering:** Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2. **Problem analysis:** An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.
3. **Investigation:** An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.
4. **Design:** An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural and societal considerations.
5. **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
6. **Individual and team work:** An ability to work effectively as a member and as a leader in teams, preferably in a multi-disciplinary setting.
7. **Communication skills:** An ability to communicate complex engineering concepts within the profession and with society at large. Such abilities include reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8. **Professionalism:** An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. **Impact of engineering on society and the environment:** An ability to analyze social and environmental aspects of engineering activities. Such abilities include an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society; the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
10. **Ethics and equity:** An ability to apply professional ethics, accountability, and equity.
11. **Economics and project management:** An ability to appropriately incorporate economics and business practices including project, risk and change management into the practice of engineering, and to understand their limitations.
12. **Life-long learning:** An ability to identify and to address their own educational needs in a changing world to sufficiently maintain their competence and contribute to the advancement of knowledge.

Source: CEAB, Accreditation Criteria and Procedures Report 2015, ISSN 1708-8054, available at:

<https://www.engineerscanada.ca/accreditation/accreditation-resources>