

STRATEGIES FOR PROCESS IMPROVEMENT AND PRODUCT DEVELOPMENT WINTER 2024

CHE 425

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CLASS SCHEDULE

Section	Location	Time	Instructor(s)
CHE 425 001 [LEC]	E6 2024	Wednesdays 3:30 p.m. - 4:20 p.m.	Lena Ahmadi lena.ahmadi@uwaterloo.ca
		Mondays 3:30 p.m. - 5:20 p.m.	
CHE 425 101 [TUT]		Wednesdays 4:30 p.m. - 5:20 p.m.	
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INSTRUCTOR & TA (TEACHING ASSISTANT) INFORMATION

Instructor Dr. Léna Ahmadi, PEng

Let's connect: <https://ca.linkedin.com/in/lenaahmadi>

Email: I check my e-mail (Lena.ahmadi@uwaterloo.ca) daily during the week and try to respond in a reasonable amount of time.

In-person Office Hours: Wednesdays, 11:45 AM - 12:45 PM (E6-2004) or by appointment.

Teaching Assistant Yasaman Rahimidarestani, PhD Candidate

Email: yrahimidarestani@uwaterloo.ca

Office Hours: Mondays, 11:30 AM - 12:30 PM (E6-5002), or by appointment.

More about the role of TA during the first lecture.

COURSE DESCRIPTION

Calendar Description for CHE 425

A course in practical statistics at a level one step beyond an elementary course. Material includes regression analysis for linear and nonlinear models, analysis of variance, statistical inference, single and multiple comparisons, and an introduction to the design of experiments including single factor designs, multifactor designs, response surface methods, d-optimality (with empirical and mechanistic models), and the analysis of undesigned data. Applications to

process improvement, product development, and research problems will be explored. Use of statistical analysis software to apply these techniques. [Offered: F, W, S, last offered as CHE 425 winter 2024]

Prereq: Level at least 3B Chemical Engineering

Please see course outline below and also complementary material to be posted on LEARN. **More specific details about all aspects of the whole course will be posted on LEARN.**

LEARNING OUTCOMES

By the end of this course students should be able to:

Estimate confidence and prediction intervals and construct ANOVA tables (variance decomposition) in both regression and design of experiments situations (1a, 1d, 2c)

Be fluent with advanced linear regression situations (correlation, prediction, analysis of residuals, model comparisons, model diagnostic checks); metrics to describe parameter uncertainty (3a, 3b, 4b, 5c)

Differentiate between design scenarios vs data analysis (randomization, replication, blocking) (2a, 6a, 7b, 8a)

Design single factor experiments: data analysis, multiple comparisons, comparison-wise vs experiment-wise error, with and without blocking of (lurking) stochastic variables (3a, 3b, 4b, 5c, 9a)

Design multifactor experiments: emphasis on 2-level full and fractional factorial designs, assessing significance of factor and factor interaction effects, confounding of effects, benefits of orthogonal and rotatable designs, estimation of process error, selection of best design fraction, screening designs to generate process information (3a, 3b, 4b, 5c, 9a)

Address questions like: why apply experimental designs, what if experiments are not designed, what if experiments do not go as planned, what if results are unexpected, empirical observations vs meaningful physico-chemical interpretations (6a, 6b, 7b, 8a, 12a, 12b)

The numbers in brackets refer to program indicators defined by the Faculty of Engineering to assess the twelve CEAB defined graduate attributes. More information is provided at the end of this document.

TENTATIVE COURSE SCHEDULE

Lecture Schedule/Room: See above under 'Class Schedule'

First lecture: Monday, January 8, 2024, Last lecture: Monday, April 8, 2024. No lectures/tutorials during winter reading week.

Course Objectives

This is a quantitative course on Applied Stats, and more specifically on the design of experiments (DOE) and the related analysis of data sets. The course will discuss the role of statistical design of experiments (and subsequent data analysis) for process/recipe improvement and product development (modeling, process troubleshooting and steps towards optimization). Topics will cover: linear regression situations; given the need for an experimental investigation, determination of an optimal experimental design (and alternative scenarios); screening designs; single and multifactor factorial designs (combined with regression and analysis of variance principles) in aid of process understanding and

further process/product design/optimization. **Very few undergrad (or grad) curricula cover this (internationally)!**

Assignment problems, along with examples in notes/book (and other practice exercises/questions given in class during lectures) are important to understand principles and techniques. Numerical results are as important as the methodology/algorithms! Most of the chapters in the course notes are indeed glorified (long) examples!

Online Communications

I will be making frequent use of UW-LEARN, and I will be sending e-mails (one at the beginning of each week) to the class. So please make sure you make a habit out of checking UWLEARN and your e-mail. Interactions (via e-mail, and MSTEams chat) between instructor/students and TA/students are encouraged (for addressing quick/simple questions and for other clarifications); if a question is longer, then individual/group meetings will be scheduled via e-mail!

Major Topics (Ch 1-8 in course notes) and Reading Assignment (Montgomery book (Mb)):

1. Ch 1, review, Statistical Background

Quick review of a typical 2nd year Engineering/Science introductory Statistics course

Reading assignment: Mb CHAPTER 2 (Do not bother with sec. 2-4.3)

2. Ch 2, review (65%, new 35%) Regression Analysis

Linear regression with matrix calculus; analysis of variance and analysis of residuals; emphasis on regression diagnostics

Reading assignment: Mb CHAPTER 10

3. Ch 3, Statistical Design of Experiments

Overview of DOE

Reading assignment: Mb CHAPTER 1

4. Ch 4, Design/Analysis of Single Factor Experiments

Randomization; replication; multiple comparisons

Reading assignment: Mb CHAPTER 3 (Study ONLY sections 3.1 to 3.4.2).

5. Ch 5, Design/Analysis of Single Factor Experiments with Blocking

Emphasis on blocking (variance reduction techniques); paired comparisons; multiple comparisons; special metrics

Reading assignment: Mb CHAPTER 4 (Study ONLY parts related to Table 4-2; Eqns (4-8) to (4-12); Example 4-1; sections 4.1, 4.1.1 and 4.1.2)

6. Ch 6, Multifactor Experiments (basis and main building blocks of DOE)

Two-level full factorial experiments and related models

Reading assignment: Mb CHAPTER 5 (Do not bother with sec. 5-3.5, 5-3.7 and 5-5), Mb CHAPTER 6 (Sections 6-1 to 6-5), Mb CHAPTER 7

7. Ch 7, Multifactor Experiments (DOE)

Two-level fractional factorials and screening designs

Reading assignment: Mb CHAPTER 8 (Study sections 8.1 to 8.6)

8. Ch 8, Concluding Remarks

What is next? Final tips

Course notes will be posted on LEARN before I start a specific chapter.

The first two chapters represent review/overview material, so they will be covered more quickly.

For each lecture you should plan to spend two to three hours reading your notes, handouts, and books. The best time to study is the same or the next day, so that no unclear points remain. Not keeping up is a sure way of failing to meet the course objectives.

Would like to review basic stats (ChE 220)? Here is our class YouTube Channel, Probability, Statistics and Design of Experiments for Engineers: <https://www.youtube.com/playlist?list=PLbZR-F5oF9np3Jgzle2zXCgcApC8EDnCR>.

Anything else? I would like to note that we (me and TA) are here to help you. Please feel free to ask for assistance if you should require any. Feel free to email me, or just please post it here anonymously: <https://www.surveymonkey.com/r/KLXSWHL>

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
Please see below	Please see below	No

Textbook

1. D.C. Montgomery (2009). Design and Analysis of Experiments (8th, 9th or 10th edition), Wiley: to complement lecture notes; the three editions are very similar; the book is very useful, even after you graduate, but buying it for the course is optional.
2. Course Notes (to be posted on UW-LEARN a few days before each chapter is initiated, Ch 1 to 8; additional 'handouts' (exercises, homework problems, other examples, etc.) distributed during lectures or posted via UW-LEARN; **check UW-LEARN (LEARN) regularly for course-related announcements/postings and information.**

STUDENT ASSESSMENT

Component	Value
Please see below	Please see below

Grading**Assignments**

20% (4 assignments) Individual work,

Due dates (Tentative): Jan 24, Feb 7, Feb 28, March 20

Midterm

20% Individual work, Wednesday March 6, 2024

Mini-project

15% Group work, Due date: Wednesday April 3

Final

45% Individual work, during final exam period

Bonus mini-workshop/activities in class

Up to 2%

Assignment is an essential element in learning the type of material being taught in this course. There will be four assignments, roughly one every two-three weeks. Submission: 1 PDF file to the Learn drop box. All assignment solutions will be posted on the course web site. Late deliverables will receive a deduction of 15% for each 12 h period, and will not be accepted after solutions are posted.

Midterm exam will give you (and me) a chance to review the material and see where you are, i.e., whether you understand the early basics. Midterm and final exams will be closed books, and closed notes unless otherwise indicated. Materials allowed: Printed stats table (available on Learn), calculator and a double-sided cheat-sheet (Just formula) for midterm and two double-sided cheat sheet (just formula) for final exams.

Completing a group mini-project is essential to understanding how to apply DOE in practical settings. Submission: 1 PDF file per group to the Learn drop box. Students have to self-enroll in the group (5 people) on UWLEARN by 11:59PM, Wednesday, January 17. If a student was not enrolled in any group by then, randomly I will assign a group to her/him/they with 4 other students on January 18. If the size of a group is less than 5, I will add student(s) to the group. If there is an individual with who you would prefer not to work as a teammate, feel free to let me know through a confidential email by January 17, 2024 (No explanation needed).

How to Succeed: The first step in doing well in this course is to realize that statistics is not a subfield of mathematics but is a distinct discipline. Statistics evolved from the need to systematically combine concepts from philosophy, the sciences, and mathematics in order to construct a coherent methodology for describing phenomena in the presence of random variation. Thus, to do well in this course you must master the concepts as well as the formulas.

ASSIGNMENT SCREENING

No assignment screening will be used in this course.

ADMINISTRATIVE POLICY

GENERATIVE AI

Generative artificial intelligence (GenAI) trained using large language models (LLM) or other methods to produce text, images, music, or code, like Chat GPT, DALL-E, or GitHub CoPilot, may be used in this course with proper documentation, citation, and acknowledgement. Permitted uses of and expectations for using GenAI will be discussed in class and outlined on assignment instructions.

Recommendations for how to cite generative AI in student work at the University of Waterloo may be found through the Library: https://subjectguides.uwaterloo.ca/chatgpt_generative_ai

(https://subjectguides.uwaterloo.ca/chatgpt_generative_ai) . Please be aware that generative AI is known to falsify references to other work and may fabricate facts and inaccurately express ideas. GenAI generates content based on the input of other human authors and may therefore contain inaccuracies or reflect biases.

In addition, you should be aware that the legal/copyright status of generative AI inputs and outputs is unclear. Exercise caution when using large portions of content from AI sources, especially images. More information is available from the Copyright Advisory Committee: <https://uwaterloo.ca/copyright-at-waterloo/teaching/generative-artificial-intelligence> (<https://uwaterloo.ca/copyright-at-waterloo/teaching/generative-artificial-intelligence>)

You are accountable for the content and accuracy of all work you submit in this class, including any supported by generative AI.

Territorial Acknowledgement: The University of Waterloo acknowledges that much of our work takes place on the traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples. Our main campus is situated on the Haldimand Tract, the land granted to the Six Nations that includes six miles on each side of the Grand River. Our active work toward reconciliation takes place across our campuses through research, learning, teaching, and community building, and is centralized within the [Office of Indigenous Relations](https://uwaterloo.ca/indigenous) (<https://uwaterloo.ca/indigenous>) .

Inclusive Teaching-Learning Spaces: The University of Waterloo values the diverse and intersectional identities of its students, faculty, and staff. The University regards equity and diversity as an integral part of academic excellence and is committed to accessibility for all. We consider our classrooms, online learning, and community spaces to be places where we all will be treated with respect, dignity, and consideration. We welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. We are all expected to contribute to a respectful, welcoming, and inclusive teaching- learning environment. Any member of the campus community who has experienced discrimination at the University is encouraged to seek guidance from the [Office of Equity, Diversity, Inclusion & Anti-racism \(EDI-R\)](https://uwaterloo.ca/equity-diversity-inclusion-anti-racism/) (<https://uwaterloo.ca/equity-diversity-inclusion-anti-racism/>) via email at equity@uwaterloo.ca (<mailto:equity@uwaterloo.ca>) . [Sexual Violence Prevention & Response Office \(SVPRO\)](https://uwaterloo.ca/sexual-violence-prevention-response-office) (<https://uwaterloo.ca/sexual-violence-prevention-response-office>) , supports students at UWaterloo who have experienced, or have been impacted by, sexual violence and gender-based violence. This includes those who experienced harm, those who are supporting others who experienced harm. SVPRO can be contacted at svpro@uwaterloo.ca (<mailto:svpro@uwaterloo.ca>)

Religious & Spiritual Observances: The University of Waterloo has a duty to accommodate religious and spiritual observances under the Ontario Human Rights Code. Please inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments. Consult with your instructor(s) within two weeks of the announcement of the due date for which accommodation is being sought.

Respectful Communication and Pronouns: Communications with Instructor(s) and teaching assistants (TAs) should be through recommended channels for the course (e.g., email, LEARN, Piazza, Teams, etc.) Please use your UWaterloo email address. Include an academic signature with your full name, program, student ID. We encourage you to include your pronouns to facilitate respectful communication (e.g., he/him; she/her; they/them). You can update your chosen/preferred name at [WatIAM](https://idm.uwaterloo.ca/watiam/). (<https://idm.uwaterloo.ca/watiam/>) You can update your pronouns in [Quest](https://uwaterloo.ca/quest/help/students/how-do-i/view-or-update-my-personal-information) (<https://uwaterloo.ca/quest/help/students/how-do-i/view-or-update-my-personal-information>) .

Mental Health and Wellbeing Resources: If you are facing challenges impacting one or more courses, contact your academic advisor, Associate Chair Undergraduate, or the Director of your academic program. Mental health is a serious issue for everyone and can affect your ability to do your best work. We encourage you to seek out mental health and wellbeing support when needed. The [Faculty of Engineering Wellness](https://uwaterloo.ca/engineering-wellness-program/) (<https://uwaterloo.ca/engineering-wellness-program/>) [Program](https://uwaterloo.ca/engineering-wellness-program/) (<https://uwaterloo.ca/engineering-wellness-program/>) has programming and resources for undergraduate students. For counselling (individual or group) reach out to [Campus Wellness and Counselling Services](https://uwaterloo.ca/campus-wellness/counselling-services). (<https://uwaterloo.ca/campus-wellness/counselling-services>) Counselling Services is an inclusive, non-judgmental,

and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more.

Intellectual Property: 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:

- Lecture content, spoken and written (and any audio/video recording thereof).
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides).
- Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
- 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 and academic integrity.

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.

Continuity Plan - Fair Contingencies for Unforeseen Circumstances (e.g., resurgence of COVID-19): In the event of emergencies or highly unusual circumstances, the instructor will collaborate with the Department/Faculty to find reasonable and fair solutions that respect rights and workloads of students, staff, and faculty. This may include modifying content delivery, course topics and/or assessments and/or weight and/or deadlines with due and fair notice to students. Substantial changes after the first week of classes require the approval of the Associate Dean, Undergraduate Studies.

Declaring absences: [*undergraduate students and/or courses only*] Regardless of the process used to declare an absence, students are responsible for reaching out to their instructors as soon as possible. The course instructor will determine how missed course components are accommodated. Self-declared absences (for COVID-19 and short-term absences up to 2 days) must be submitted through [Quest](https://uwaterloo.ca/quest/help/students/how-do-i/self-declare-absence-undergraduate-students) (<https://uwaterloo.ca/quest/help/students/how-do-i/self-declare-absence-undergraduate-students>). Absences requiring documentation (e.g., Verification of Illness Form, bereavement, etc.) are to be uploaded by completing the form on the [VIF System](https://vif.uwaterloo.ca/) (<https://vif.uwaterloo.ca/>). The [UWaterloo Verification of Illness form](https://uwaterloo.ca/campus-wellness/health-services/student-medical-clinic/verification-illness-services) (<https://uwaterloo.ca/campus-wellness/health-services/student-medical-clinic/verification-illness-services>), completed by a health professional, is the only acceptable documentation for an absence due to illness. Do not send documentation to your advisor, course instructor, teaching assistant, or lab coordinator. Submission through the VIF System, once approved, will notify your instructors of your absence.

Rescheduling Co-op Interviews: Follow the co-op process for [rescheduling co-op interviews](https://uwaterloo.ca/co-operative-education/find-your-co-op-job/find-job-waterlooworks/interview/interview-conflicts) (<https://uwaterloo.ca/co-operative-education/find-your-co-op-job/find-job-waterlooworks/interview/interview-conflicts>) for conflicts to graded assignments (e.g., midterms, tests, and final exams). Attendance at co-operative work-term employment interviews is not considered to be a valid reason to miss a test.

The twelve graduate attributes are defined by the Canadian Engineering Accreditation Board (CEAB). Program indicators are defined by the Faculty of Engineering to assess these attributes.

Graduate Attribute	Program Indicator
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1. A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.	1a Demonstrate understanding of concepts in mathematics.
	1b Demonstrate understanding of concepts in natural science.
	1c Demonstrate understanding of engineering fundamentals.
	1d Demonstrate understanding of specialized engineering knowledge.
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.	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.
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.	3a Create investigative studies of complex engineering problems.
	3b Gather information from relevant sources to address complex engineering problems.
	3c Synthesize information from multiple sources to reach 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.	4a Define design requirements and specifications for complex, open-ended engineering problems.
	4b Critically evaluate and compare design choices.
	4c Generate and refine potential solutions to complex, open-ended design problems.
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.	5a Select appropriate engineering tools, considering their limitations.
	5b Modify and/or create appropriate engineering tools, identifying their limitations.
	5c Use engineering tools appropriately.
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.	6a Contribute as an active team member or leader to complete individual tasks.
	6b Collaborate with others to complete tasks effectively as a team.
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.	7a Orally present information within the profession and to society at large.
	7b Communicate in a written format within the profession and to society at large.
	7c. Interpret information, including 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.	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.

9. Impact of Engineering: 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.	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 and environmental stewardship in making decisions.
10. Ethics & Equity: An ability to apply professional ethics, accountability, and equity.	10a Identify ethical and unethical behavior in professional situations.
	10b Identify how an engineer is accountable to multiple stakeholders in engineering practice.
	10c Identify equitable and inequitable situations or behaviors.
11. Economics & 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.	11a Apply project management techniques and other business practices in engineering projects, with attention to risk and change.
	11b Perform economic analyses of engineering projects with attention to uncertainty and 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.	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 received.

UNIVERSITY POLICY

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 [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.]

Grievance: A student who believes that a decision affecting some aspect of their 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/policies-procedures-guidelines/policy-70) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) . 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 an academic offence, and to take responsibility for their actions. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.] 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 instructor, 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](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) . For typical penalties, check [Guidelines for the Assessment of Penalties](https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties) (<https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties>) .

Appeals: A decision made or penalty imposed under [Policy 70, Student Petitions and Grievances](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) (other than a petition) or [Policy 71,](https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties)

Student Discipline (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to **Policy 72, Student Appeals** (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>) .

Note for students with disabilities: **AccessAbility Services** (<https://uwaterloo.ca/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.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.