Western Engineering

DEPARTMENT OF CHEMICAL & BIOCHEMICAL ENGINEERING

CBE 2220a Chemical Process Calculations

Course Outline Fall/Winter 2026-2027

Instructor: Lauren Tribe

LECTURE:	3 hours per week
LAB or TUTORIAL:	2 hours per week
ANTIREQUISITE(s):	none
PREREQUISITE(s):	Applied Mathematics 1411A/B, 1413, Chemistry 1024A/B or the former Chemistry 1050, 1020 or 023, Physics 1401A/B or the former Physics 1026
CEAB Academic Units:	Engineering Science 90% Complimentary Studies 10%
TEXT / Course Resources / References	Course notes will be available on Brightspace

COURSE DESCRIPTION

The objective of this course is to introduce second year students to the field of chemical and biochemical engineering. The basic concepts employed in chemical and biochemical engineering will be covered. Examples of chemical, biochemical, and environmental industries will be presented. New directions in chemical and biochemical engineering will be introduced.

General Learning Objectives (CEAB Graduate Attributes)

Knowledge Base		Engineering Tools		Impact on Society	
Problem Analysis		Individual & Teamwork		Ethics and Equity	I
Investigation		Communication		Economics and Project Mgmt.	
Design		Professionalism	I	Life-Long Learning	

Rating:

I – The instructor will introduce the topic at the level required. It is not necessary for the student to have seen the material before.

D – There may be a reminder or review, but the student is expected to have seen and been tested on the material before taking the course.

A – It is expected that the student can apply the knowledge without prompting (e. g. no review).

Specific CEAB Graduate Attributes

PR1 – Familiarity with provincial engineering legislation and other relevant standards

PR2 – Recognizes role of protection of public

PR3 – Shows an awareness of the PEO and the role of licensing

EE1 – Demonstrates knowledge of professional ethics

EE2 – Application of Ethical Behavior

Evaluation Components

(1) Reflections - There will be two reflective assignments worth 2% each for a total of 4% of the final grade.
(2) Ethics Test - There will be an ethics test worth 10% of the final grade.
(3) Mass and Energy Balance Tests - There will be four mass and energy balance tests each worth 12% for a total of 48% of the final grade.
(4) Final Exam - The final exam is 38% of the final grade.

Reflections

The reflection assignments are due on Monday September 14, 2026 at 11:59pm and on Monday October 5, 2026 at 11:59pm through the assignments tab on Brightspace.
You are expected to submit the reflection by the deadline. Should illness or extenuating circumstances arise, students are permitted to submit their reflection up to 48 hours past the deadline without academic penalty. Should students submit their reflection beyond 48 hours past the deadline, a grade of 0% will be assigned. As flexible deadlines are used for these assessments, requests for academic consideration will not be granted. If you have a long-term academic consideration or an accommodation for disability that requires greater flexibility than provided here, please reach out to the Course Coordinators at least one week prior to the posted deadline.
GenAI tools may not be used in the completion of the reflection assignments as these assignments are personal and important comments about your approach and goals for the course.

Ethics Test

There will be an in-class ethics test on Monday September 21, 2026. This assessment is considered to be central to the learning objectives of the course. Accordingly, students seeking academic consideration for this assessment will be required to provide supporting documentation. Students who are granted academic consideration for the ethics test will have re-weighting such that their final exam will then be 48% of the final grade.

Mass and Energy Balance Tests

There will be four mass and energy balance in-class tests on Monday September 28, Monday October 19, Monday November 2 and Monday November 16, 2026. The best 3 of 4 mass and energy balance tests will be used to calculate the grade for this component. As

there is flexibility in these mass and energy balance tests, requests for academic consideration will not be granted. If you have a long-term academic consideration or an accommodation for disability that requires greater flexibility than provided here, please reach out to the Course Instructor at least one week prior to the posted deadline.

Final Exam
There will be a final exam scheduled by The Office of the Registrar during the official final exam period.

Other Components
There will be four assignments with corresponding tutorials on Monday October 26, Monday November 9, Monday November 23, and Monday November 30, 2026. These assignments are intended to help practice and learn course concepts. They are formative and will not be graded.

Brightspace Resources and Course Materials
Course notes will be available on the course Brightspace site. There are no course materials that must be purchased by students. However, students may wish to print out hard copies of some frequently used tables for energy balances.

GenAI Statement
GenAI tools may not be used for the reflection assignments. GenAI tools, however, may be used in summarizing content and helping to prepare for tests and the final exam.

Specific Course Topics
Unit I: Introductory Concepts
By the end of the first unit, students should understand or become familiar with
- What is chemical and biochemical engineering
- Ethics, Equity and Professional Engineering concepts for choosing engineering solutions
- Common chemical and biochemical engineering processes
- Engineering units and conversion between units of different systems
- Dimensional consistency and dimensionless groups

Unit II: Material Balances
By the end of the second unit, students should be able to
- Understand the principles of material balances
- Find solution strategies of material balance problems
- Perform material balances in a single unit
- Perform material balances involving multiple units, recycle, bypass and purge streams
- Integrate chemical reaction and elemental balances into material balances
- Identify limiting and excess reactants, calculate fractional conversion and fractional yield

Unit III: Energy Balances
By the end of the third unit, students should be able to
- Understand forms of energy and energy exchange
- Perform a combined material and energy degree-of-freedom analysis
- Estimate the physical properties of process streams.
- Perform energy balances in non-reacting and reacting systems

Faculty of engineering Policies and Procedures-Undergraduate
The Faculty of Engineering has established for 2025 a set of Policies and Procedures for Undergraduate Students. The policy covers:

- Absence/Late Accommodation Policy
- Religious Accommodation
- Academic Integrity
- Academic Offences
- Faculty of Engineering AI Policy
- Accessibility
- Inclusivity, Diversity, and Respect
- Health and Well-being