

ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəyəm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

COURSE INFORMATION

Course Title	Course Code Number	Credit Value
Chemical Process Engineering	CHBE 471	4

PREREQUISITES

All of CHBE 241, 344, 345, 346, 352, 355, 376

COREQUISITES

None

CONTACTS

Course Instructor(s)	Contact Details	Office Location	Office Hours
Pranav Chintalapati (He/Him)	pranav.c@ubc.ca	CHBE 401	By appointment

Note: My preferred method of contact is a direct email to the address above. I do not have set office hours, so please email me to set up a time if you'd like to meet. Emails received after 6pm will typically not receive a response until the next day.

OTHER INSTRUCTIONAL STAFF

Teaching Assistants:

Genpei Cai genpei97@mail.ubc.ca

Shiqi Yu shiqi.yu@alumni.ubc.ca

Note: The Teaching Assistants will be leading your tutorial sessions and marking your work. Please reach out to them if you have questions about tutorials or assignments.

COURSE STRUCTURE

Lectures

Tuesdays and Thursdays 8:00 AM – 9:20 AM in MCLD 2018

Tutorials

Mondays 2:00 PM – 3:50 PM in CEME 1202

TEXTBOOKS

Turton, R., Shaeiwitz, J.A., Bhattacharyya, D., Whiting, W.B. *Analysis, Synthesis, and Design of Chemical Processes*. 5th Edition. 2018. - 3rd and 4th Ed. **Available online through UBC library**

Or, if you can find it: Turton, R., Shaeiwitz, J.A., *Chemical Process Equipment Design*. 2017.

Other Reference Texts:

Seider, Seader, Lewin, Widagdo, Ng. *Product and Process Design Principles: Synthesis, Analysis and Evaluation*. 4th Edition. 2016. – **Full Text available online through UBC library**

Coulson and Richardson's *Chemical Engineering* (2017). – **Full Text available online through UBC library**

SCHEDULE OF TOPICS

The focus of this course is to develop student proficiency on the essential technical concepts for chemical process engineering and prepare students to develop preliminary designs of major pieces of equipment found in the chemical process industries. It is assumed that students are well-versed in the theoretical background and derivation of formulas covered in the prerequisite courses. The following topics will be covered in this course:

Topic	Subtopic	Content
1: Material Flow	1.1	Liquids
	1.2	Gases
	1.3	Solids, Slurries and Non-Newtonian Fluids
2. Heat Exchange	2.1	Heat Exchanger Design
	2.2	Furnaces
	2.3	Heat Integration
3: Separation	3.1	Separator Selection
	3.2	Separator Design

	3.3	Solids Separation
	3.4	Sequencing of Ordinary Distillation Columns
4: Reactors	4.1	Reactor Basics (Kinetics, Equilibrium)
	4.2	Reactor Models (CSTR, PFR, Batch)
	4.3	Reactor Design for Non-Isothermal Conditions
5: Other Equipment	5.1	Pressure Vessel Design
	5.2	Phase Separator Design

LEARNING OUTCOMES

At the end of the semester, the successful CHBE 471 student should be able to:

- Select and design major pieces of equipment encountered in chemical process industry.
- Perform a thorough analysis and design of heat exchanger networks for minimizing heating/cooling costs in a plant.
- Select and design optimal sequence of separators in a chemical processing plant.

PENALTIES

Please submit your assignments on time! The TAs will aim to return your assignments to you within 7 days of submission. Therefore, late submissions will be deducted 15% of the total mark for each day past the due date, and submissions will not be accepted 7 days past the due date.

ASSESSMENTS OF LEARNING

Assessments	Value	Count	Total	
Tutorials	1.25%		4	5%
Assignments	5%		4	20%
Midterms	15% & 20%		2	35%
Final Exam	40%		1	40%
		TOTAL:		100%

This is the assessment breakdown agreed upon by the class during our first lecture. The midterm with the higher score will be weighted 20%.

OTHER COURSE POLICIES

- **If you are sick, it is important that you stay home – no matter what you think you may be sick with (e.g., cold, flu, other).**
- A daily self-health assessment is required before attending campus. Every day, before coming to class, complete the self-assessment for Covid symptoms using this tool:
<https://bc.thrive.health/covid19/en>
- Do not come to class if you have Covid symptoms, have recently tested positive for Covid, or are required to quarantine. You can check this website to find out if you should self-isolate or self-monitor: <http://www.bccdc.ca/health-info/diseases-conditions/covid-19/self-isolation#Who>.
- Your precautions will help reduce risk and keep everyone safer.

UBC Respectful Environment Statement

- The University of British Columbia envisions a climate in which students, faculty and staff are provided with the best possible conditions for learning, researching and working, including an environment that is dedicated to excellence, equity and mutual respect. The University of British Columbia strives to realize this vision by establishing employment and educational practices that respect the dignity of individuals and make it possible for everyone to live, work, and study in a positive and supportive environment, free from harmful behaviours such as bullying and harassment.

Vaccine Etiquette and Health considerations

- The University is taking guidance from the BC Public Health Office. The information in this syllabus is based on the current public health orders. Should this information change we will adapt accordingly.
- Masks are recommended in all classrooms, and indoor public spaces as per the current guidelines. For our in-person meetings in this class, it is important that all of us feel as comfortable as possible engaging in class activities while sharing an indoor space.
- An individual's vaccine status is a matter of personal privacy. It is not appropriate to ask an individual about their vaccine status, nor is it appropriate to make group or classroom policies based on vaccine status.
- Students feeling unwell should stay home in an effort to prevent the transmission of viruses in general.
- Students are encouraged to sit in the same place or section of the room throughout the term if possible to minimize the number of close contacts you have with others.

When contacting instructors or teaching assistants

- Please include the course code in your subject heading, and include your name and student number in all communications. Please refer to this syllabus and updates on Canvas first before asking your question – the information you seek may already be published.

UNIVERSITY POLICIES

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on [the UBC Senate website](#).

STUDENT RESOURCES

UBC is committed to a community in which every member is respected, included, and celebrated. Taking care of your health and wellbeing is important. [UBC Health & Wellness \(opens in a new window\)](#) is here to support wellness of mind, body, and spirit, and provides a range of clinical, counselling, and mental health services for students.

[The Centre for Accessibility \(opens in a new window\)](#) facilitates educational equity for students with disabilities and chronic medical conditions. If you think you may need academic accommodations to meet the learning outcomes of this course and you have a disability please contact the Centre for Accessibility. If you're not sure that you qualify as having a disability but are concerned, the Centre for Accessibility can help clarify if you are eligible.

Academic Advising empowers students to take ownership of their education at UBC by offering personalized advising services in a supportive environment.

For CHBE-specific issues such as CHBE course registration and planning, you can connect with [CHBE Departmental staff \(opens in a new window\)](#). Drop-in meetings with and advising by CHBE staff is available through Zoom. Staff is available Monday to Friday from 9:00 am to 3:30 pm. You may also email your questions or requests for appointments to undergrad@chbe.ubc.ca. Your email should include your student ID and the specific nature of your enquiry.

For issues beyond CHBE, such as academic concession, late withdrawals, SD exams, and letters of permission/completion, you can reach out to [Engineering Academic Services \(opens in a new window\)](#).

[First Nations Longhouse \(opens in a new window\)](#): The First Nations Longhouse serves as a “home away from home,” as well as an academic, social, spiritual, and cultural hub for Indigenous students attending UBC.

[Indigenous Liaison for the Faculty of Applied Science \(opens in a new window\)](#): Catherine McInnis is the designated advisor in Engineering Academic Services for Indigenous students in the Engineering program. faculty member in the position of the Indigenous Liaison for the School of Nursing. You can connect with her through the PD portal or email her directly with three suggested times you are available. Email: catherine.mcinnis@ubc.ca

[International Student Advising \(opens in a new window\)](#) provides advising and resources to assist International students in navigating immigration, health insurance, and settlement matters. Come see an advisor if you have questions about:

UBC's Equity & Inclusion Office provides information about [accessible and all-gender washrooms on campus \(opens in new window\)](#). Information about how to update [legal and preferred names \(opens in a new window\)](#) can be found on the Student Services website. [UBC Trans and Non-binary Student Guide \(opens in a new window\)](#) was written in Summer 2020 and describes resources and support on campus for trans and non-binary students.

[The Office of the Ombudsperson \(opens in a new window\)](#) works with all UBC community members to ensure students are treated fairly and can learn, work, and live in a fair, equitable and respectful environment. If you have concerns about relevant UBC policies and/or processes, an Ombuds Officer can identify and explain policies and guide you in exploring options for directly and effectively dealing with your concerns.

The [Sexual Assault Support Center \(SASC\) \(opens in a new window\)](#) is committed to the education, support, and empowerment of people of all genders who are survivors of sexualized violence, as well as their friends and family.

UBC Applied Science invites your [feedback and recommendations regarding EDI experiences \(opens in a new window\)](#) within the Faculty on curriculum, programs, extra and co-curricular activities, mistreatment or inappropriate conduct that you have experienced or witness, ongoing concerns or challenges, workplace culture, and physical environment. Submissions are anonymous.

[Centre for Writing and Scholarly Communication \(opens in a new window\)](#) provides consultations, workshops and other resources for UBC Vancouver community members with varying levels of academic English proficiency. A writing consultation is a personalized conversation about your work.

[Chapman Learning Commons \(opens in a new window\)](#) is a central point to access resources to support your learning; the emphasis is on peer-led support. Sample resources include: advice on online learning, equipment loans (AV to regular office supplies), and tutoring.

[Understand Academic Integrity - Chapman Learning Commons \(opens in a new window\)](#) is a guide explaining academic integrity with frequently asked questions and tips for avoiding plagiarism.

[APSC Student Clubs and Affinity Groups \(opens in a new window\)](#) Find APSC student, faculty and staff-led organizations and initiatives that support equity deserving groups and provide opportunities for allies to engage.