

CHEE 415 – ENGINEERING CHEMISTRY LABORATORY

Course Syllabus – Winter 2022

This is your course syllabus. Please download the file and keep it for future reference.

LAND ACKNOWLEDGEMENT

Queen's University is situated on traditional Anishinaabe and Haudenosaunee Territory.

See: <http://www.queensu.ca/encyclopedia/t/traditional-territories>

INCLUSIVITY STATEMENT

Queen's students, faculty, and staff come from every imaginable background – small towns and suburbs, urban high rises, Indigenous communities, and from more than 100 countries around the world. You belong here: <https://www.queensu.ca/inclusive/>.

TEACHING TEAM

COURSE INSTRUCTOR

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For an up-to-date list of personnel, please check the course website.

CHEE 415 (W 0.25-3.5-0.25 4.0)

COURSE DESCRIPTION

Bench- and pilot-scale laboratory exercises provide students practical experience with chemical operations involving transport phenomena, thermodynamics, reaction kinetics and process control. Working with minimal supervision, student teams plan and execute experiments, analyze acquired data according to engineering science models, and communicate key findings in concise technical reports.

Prerequisite CHEE 330.

(0/0/0/48/0) (Mathematics/Natural Sciences/Complementary Studies/Engineering Science/Engineering Design)

COURSE LEARNING OUTCOMES (CLO)

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

CLO	DESCRIPTION	INDICATORS
CLO 1	Demonstrate proficiency in operation and control of process and analytical equipment.	ET-Create ET-Apply ET-Limitations
CLO 2	Demonstrate engineering judgment and an awareness of the nature and magnitude of physical and chemical effects and factors, as well as errors and uncertainties.	PA Formulate PA-Evaluate
CLO 3	Collect and interpret data to draw meaningful conclusions and evaluate the strengths, weaknesses and limitations of current chemical engineering theory.	IN-Conduct IN-Analyze IN-Synthesis
CLO 4	Demonstrate effective independent learning, initiative, originality and creativity in completion of pre-lab preparation and other tasks.	LL-Information
CLO 5	Work effectively as group member and demonstrate good leadership skills when team leader, adopting a professional approach during all project phases.	TW-Contribution TW-Feedback PR-Interpersonal
CLO 6	Document and follow appropriate safety protocols.	IN-Safety

This course develops the following attributes at the 4th year level:

Problem Analysis (PA):

PA-Formulate Develop appropriate frameworks for solving complex engineering problems.

PA-Evaluate Analyze solutions to complex engineering problems to draw conclusions.

Investigation (IN):

IN-Conduct Conduct investigations to test hypotheses related to complex problems

IN-Analyze Analyze and interpret data using appropriate techniques and tools

IN-Synthesis Synthesize information from investigations considering sources of uncertainty and limitations to reach substantiated conclusions.

IN-Safety Adhere to appropriate workplace safety protocols in all work environments.

Engineering Tools (ET):

ET-Create Develop, adapt and/or extend appropriate software, equipment, models, and simulations for a range of engineering activities.

ET-Apply Apply and manage appropriate techniques, apparatus, databases, models, tools, and/or processes to accomplish a task.

ET-Limitations Evaluate limitations and errors of instrumentation/measurement techniques/models/ simulations to assess appropriateness of the results.

Individual and teamwork (TW):

TW-Contribution Take initiative to plan, organize and complete tasks, as an individual and team member, in order to meet goals

TW-Feedback Share ideas and information by eliciting, giving and applying positive and effective feedback.

Professionalism (PR):

PR-Interpersonal Demonstrate professional conduct and integrity.

Life-long learning (LL):

LL-Information Identify, organize, and critically evaluate information from an appropriate range of sources, to meet learning needs.

RELEVANCE TO THE PROGRAM

This course provides students the practical experience they need to deepen their understanding of chemical thermodynamics, reaction engineering, process control, and transport phenomena. Comparing the performance of real unit operations to engineering science models will improve students' understanding of the strengths and limitations of their technical knowledge. Direct intervention by course instructors is minimized to encourage student teams to develop independent engineering judgement, and to illustrate the importance of lifelong learning.

COURSE EVALUATION

ASSESSMENT WEIGHTING

Deliverable*	Week or Date	Weight	Alignment with CLOs
Course orientation & safety briefing quiz	Week 1	3%	6
Five individually-prepared laboratory reports (13.0% per lab)	see course term schedule table for due dates, etc.	65%	1, 2, 3, 4
Five individually-completed pre-lab quizzes (6.4% per lab)	"	32%	3

* See course onQ (D2L) website for assessment descriptions.

GRADING

All assessments in this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to the established [Grade Point Index](#).

Should it come to the attention of the instructors that a group member has made an unsatisfactory contribution to the group effort, grades can be adjusted down at the discretion of the instructor.

Feedback on Assessments

The Project Supervisors will provide feedback on graded activities on onQ. You can expect feedback on your assessments within ten to fourteen days of the due date.

Accessing Your Final Grade

Your final grades will show on SOLUS. Official transcripts showing final grades will be available on the Official Grade Release Date at the end of term.

COURSE MATERIALS

Required Textbook

- No textbook required

The main information resource for CHEE 415 is the course onQ (D2L) website. Information related to deliverable expectations, evaluation rubrics, safety, schedules, project information, etc. can all be found in content modules on the course onQ website.

Other technical information related to lab projects can be found in published scientific literature and materials on reserve at Queen's Stauffer Library.

Required Hardware/Software

Students must have a reliable [internet connection and hardware](#) that are compatible with online learning requirements.

Suggested Time Commitment

Learners can expect to invest on average 10-11 hours per week in this course.

COURSE STRUCTURE AND ACTIVITIES

There are no regularly scheduled lectures for this course. There are mandatory course orientation and safety presentations during the 1st week of term. After completing the course orientation quiz, teams consisting of 3 or 4 students are assigned by the course instructor. These teams remain together for the term and perform 5 of the available engineering lab experiments.

Teams are expected to function independently during all project phases but are encouraged to consult their Project Supervisor (TA) regarding technical challenges, and with Chemical Engineering Technologists regarding apparatus-related issues. The Course Instructor can be consulted on matters related to assessment, team dynamics, deadline extensions / penalties, course polices, etc.

All laboratory projects involve completion of the following main tasks:

- Laboratory preparation and individual completion of an online pre-lab quiz
- Group execution of experimental work and data acquisition
- Individual data analysis and reporting

EXPECTATIONS FOR PRE-LAB/LAB WORK/FINAL DELIVERABLES

Pre-lab preparation and individual completion of a pre-lab quiz will be done for each lab project. Experimental work will be completed as a group. Completion of the laboratory assignment report template will be done individually for all lab projects.

COURSE SCHEDULE (WINTER 2022)

CHEE 415 Term Schedule - Winter 2022
<p>Week 1 of Term (Jan. 10 to 14)</p> <ul style="list-style-type: none"> • No lab work in week 1. • Individually study course orientation & safety presentations in the "Course Orientation" module on onQ, and individually complete the mandatory quiz by 10:00 pm EST on Monday, Jan. 17.
<p>Weeks 2 to 12 of Term (Jan. 17 to Apr. 8)</p> <ul style="list-style-type: none"> • Lab groups and lab work schedule will be assigned by Course Instructor before the end of week 2. • Complete 5 Chemical Engineering Laboratory Projects <ul style="list-style-type: none"> • Check project, supervisor and lab work date in Table 9.2. • Contact your group members and begin preparing for current project. <ul style="list-style-type: none"> • Study project-related reference materials (can be done as group or individually). • Plan lab procedures (recommended to be done as group). • Individually complete pre-lab quiz on onQ any time before attending lab work session. • On the lab work date and time specified in Table 9.2: <ul style="list-style-type: none"> • <u>Fully in-person or hybrid lab groups</u> (i.e. groups with at least 2 members able to perform lab work in-person): <ul style="list-style-type: none"> - In-person members perform lab work on assigned lab date according to protocols specified in the lab manual document "11. Laboratory Work Modes & COVID Safety Protocols" - Remote members of hybrid lab groups will observe/participate in lab work via a Zoom meeting video link on an in-person member's laptop pc at the scheduled lab time • <u>Fully remote lab groups</u> (i.e. groups with all remote members, or instances where all lab work is forced to remote-only mode due to any COVID issue/s): <ul style="list-style-type: none"> - A unique data set and series of short video clips of instrumentation behaviour will be provided to the group on onQ up to 48 hours before the group's assigned lab work timeslot • All students individually analyze data. • All students individually complete and submit lab report template as a single .pdf file via the CHEE 415 onQ website by 9:00 pm on the designated due-date in Table 9.3. Hard copy submissions are not required.

COURSE COMMUNICATION

NETIQUETTE

In this course, you may be expected to communicate with your peers (lab group members) and the teaching team (Project Supervisors, Chemical Engineering Technologists & Course Instructor) through electronic communication. You are expected to use the utmost respect in your dealings with your colleagues or when participating in activities, discussions, and online communication.

Following is a list of netiquette guidelines. Please read them carefully and use them to guide your online communication in this course and beyond.

1. Make a personal commitment to learn about, understand, and support your peers.
2. Assume the best of others and expect the best of them.
3. Acknowledge the impact of oppression on the lives of other people and make sure your writing is respectful and inclusive.
4. Recognize and value the experiences, abilities, and knowledge each person brings.

5. Pay close attention to what your peers write before you respond. Think through and re-read your writings before you post or send them to others.
6. It's alright to disagree with ideas, but do not make personal attacks.
7. Be open to be challenged or confronted on your ideas and challenge others with the intent of facilitating growth. Do not demean or embarrass others.
8. Encourage others to develop and share their ideas.

QUESTIONS ABOUT COURSE MATERIAL

Questions or comments regarding the course structure, requirements, policies, etc. should be addressed with the Course Instructor. Questions related to technical aspects of your lab project should be address with your Project Supervisor or, if equipment-related, one of the Chemical Engineering Technologists.

COURSE ANNOUNCEMENTS

The instructor will post course news in the Announcements section on the main course homepage on onQ. Please sign up to be automatically notified by email when the instructor posts new information in onQ Announcements.

OFFICE HOURS

Use e-mail to arrange meeting times with the Course Instructor, your Project Supervisor, or one of the Chemical Engineering Technologists.

CONFIDENTIAL MATTERS

If you have a confidential matter you would like to discuss with your instructor, their contact details are on the first page of this document. Expect email replies within 48 hours.

COURSE POLICIES

Please review the following policies concerning copyright, academic integrity, absences and academic accommodations:

COPYRIGHT

The material presented in this course is intended for use as part of the course at Queen's University and is the property of the instructor unless otherwise stated. Copying this material for distribution (e.g. uploading material to a commercial third-party website) can lead to a violation of Copyright law and constitutes a violation of Academic Integrity.

ACADEMIC INTEGRITY

As an engineering student, you have made a decision to join us in the profession of engineering, a long-respected profession with high standards of behaviour. As future engineers, we expect you to behave with integrity at all times. Please note that Engineers have a duty to:

- Act at all times with devotion to the high ideals of personal honour and professional integrity.
- Give proper credit for engineering work

The standard of behaviour expected of professional engineers is explained in the [Professional Engineers Ontario Code of Ethics](#). Information on policies concerning academic integrity is available in the [Queen's University Code of Conduct](#), in the [Senate Academic Integrity Policy Statement](#), on the [Faculty of Engineering and Applied Science website](#), and from your instructor.

Departures from academic integrity include plagiarism, use of unauthorized materials or services, facilitation, forgery, falsification, unauthorized use of intellectual property, and collaboration, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the University.

LATE POLICY

Unless other arrangements have been approved, [departmental policies](#) regarding late and missed assignments, and missed quizzes/exams will be followed. In the event of extenuating circumstances, you may request an extension to an assignment due date without penalty. Requests must be made to your instructor prior to the original due date of the assignment, and some substantiating documentation is often required (see information below on absences). Note that unacceptable reasons include extra-curricular activities, travel plans, generally behind on schoolwork, etc. In the absence of substantiating documentation, the normal late penalty will apply as described in the assignment or departmental policies.

ABSENCES (ACADEMIC CONSIDERATIONS) AND ACADEMIC ACCOMMODATIONS

For absences and academic accommodations please review the information on the [FEAS website](#).

ACADEMIC AND STUDENT SUPPORT

Queen's has a robust set of supports available to you including the [Library](#), [Student Academic Success Services \(Learning Strategies and Writing Centre\)](#), and [Career Services](#). Learners are encouraged to visit the Faculty of Engineering and Applied Science [Current Students](#) web portal for information about various other policies such as academic advisors, registration, student exchanges, awards and scholarships, etc.

INDIVIDUAL NEEDS AND SUPPORT

If you have a disability or health-related condition that may require academic accommodations, please approach the [Queen's Accessibility Services](#). The staff at Accessibility Services are available by appointment to develop individualized accommodation plans, provide referrals, and assist with advocacy. The sooner you let us know your needs, the better we can assist you in achieving your learning goals. For questions or assistance with requesting Academic

Consideration or Accommodation, contact the FEAS Academic Accommodation Coordinator at engineering.aac@queensu.ca

Every effort has been made to provide course materials that are accessible. For further information on accessibility compliance of the educational technologies used in this course, please consult the links below.

EDUCATIONAL TECHNOLOGY	ACCESSIBILITY COMPLIANCE INFORMATION
onQ (Brightspace Learning Management System by D2L)	https://www.d2l.com/accessibility/standards/
Zoom	https://zoom.us/accessibility

If you find any element of this course difficult to access, please discuss with your instructor how you can obtain an accommodation.

RELIGIOUS OBSERVANCE

Students in need of accommodation for religious observance are asked to speak to their professor within a week of receiving their syllabus. Note also that alternative assignments are considered a "reasonable accommodation" under the Ontario Human Rights Code. Students with questions about their rights and responsibilities regarding religious accommodation should contact Chaplain Kate Johnson via Chaplain@queensu.ca.

TECHNICAL SUPPORT

Some basic comfort level with basic hardware and software skills are required for this course. If you require technical assistance, please contact [Technical Support](#).

SUPPORTIVE PERSONAL COUNSELLING

If at any time you find yourself feeling overwhelmed, anxious, sad, lonely, or distressed, consider confidential supportive counselling offered by the [embedded counselors](#) at the Student Wellness Service Faculty of Engineering and Applied Science.