Faculty of Engineering and Applied Science

CHEE 420 – LABORATORY PROJECTS III

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

David Poirier, M.Sc., P.Eng.
Chemical Engineering
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For an up-to-date list of personnel, please check the course website.

CHEE 420 (W K4)

Course Description

Students will work as teams to tackle projects that require bench and pilot plant equipment, and computer packages that simulate commercial processes. The projects will be more extensive and integrated than in previous laboratory courses (CHEE 218 & 315) and will require a thorough and comprehensive analysis of processes and operations. A strong emphasis is placed on project planning and management, as well as professional communication with supervisors. The design component of this course is found in the application of process analysis skills to solve problems. The projects require the students to apply critical and problem-solving skills in the operation or simulation of laboratory and process equipment with the goal of solving a problem for a fictitious industrial client. The projects may involve analysis or troubleshooting of existing equipment, or an investigation of the applicability of a concept to a new area.

Prerequisites: CHEE 311, CHEE 321, CHEE 330, CHEE 315, CHEE 319, or permission of the department.

(0/0/16/16/16) (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-Analysis IN-Synthesis
CLO 4	Write concise, coherent, and grammatically correct lab reports that reflect critical analysis and synthesis. Deliver clear and organized formal oral presentations.	CO-Written CO-Spoken CO-Graphics
CLO 5	Demonstrate effective independent learning, initiative, originality, and creativity in completion of pre-lab preparation and other tasks.	LL-Acquisition LL-Information
CLO 6	Work effectively as group member and demonstrate good leadership skills when team leader, adopting a professional	TW-Contribution TW-Feedback

	approach during all project phases.	PR-Interpersonal
CLO 7	Document and follow appropriate safety protocols.	IN-Safety
CLO 8	Design appropriate experimental protocol to reach substantiated conclusions.	IN-Conduct IN-Synthesis

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.

Communications (CO):
CO-Written Produce clear, concise, precise, and well-organized written communication with language appropriate for the audience.
CO-Spoken Deliver formal and informal oral presentations with suitable language, content, style, timing, and flow, while adapting format, content and tone to audience and purpose.
CO-Graphics Create figures, maps, tables, and drawings to engineering report standards.

Professionalism (PR):
PR-Interpersonal Demonstrate professional conduct and integrity.

Life-long learning (LL):
LL-Acquisition Independently acquire new knowledge and skills for ongoing personal and professional development.

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 opportunities for students to apply engineering science knowledge gained from their previous and current core courses, and to exercise and develop engineering judgment, in the operation and analysis of real chemical engineering processes. The structure of the course requires students to approach their lab project work like practicing engineers, hence contributing to the development of communication skills, professionalism, and an appreciation for the need of life-long learning to become and remain effective engineers.

COURSE EVALUATION

Assessment Weighting

Deliverable*	Week or Date	Weight	Alignment with CLOs
Course orientation and safety briefing quiz	1st week of classes	2%	
Letters of proposal (9% per project)	see course term schedule table for due dates	18%	2, 5, 6, 8
Formal final oral presentations (5% per project)	"	10%	4
Two formal technical laboratory reports (35% per project)	"	70%	1, 2, 3, 4, 5, 7, 8

* 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.

Feedback on Assessments

The Project Supervisors will provide feedback on graded activities on onQ. You can expect feedback on your assessments within 3 weeks 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 420 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 provided by your Project Supervisor.

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. Mandatory course orientation and safety presentations are given during the 1st week of term. Students are asked to provide a preference of team members and a project preference list. Based on these lists, lab teams of 2 or 3 students are formed and projects assigned before the end of the first week of classes. All attempts are made to meet the preferences of the students; however, a final decision will be made by the Laboratory Coordinator. Teams are expected to function independently during all phases of their projects, but are permitted to consult with their Project Supervisor if they have difficulties related to technical aspects of their project, or with one of the Chemical Engineering Technologists if they have apparatus-related issues.

In teams of two or three, students complete two major lab projects. The laboratory projects involve completion of the following main tasks:

- Preliminary background research based on the project description provided on the course onQ (D2L) website.
- Initial meeting with Project Supervisor to clarify project objectives.
- Preparation, submission, and oral presentation of project proposal to Supervisor
- Experimental Work
- Formal Report - Preparation & Submission

- Final Oral Presentation

EXPECTATIONS FOR PRE-LAB/LAB WORK/FINAL DELIVERABLES

All project-related work will be completed as a team. Each group member is required to contribute equally to the preparation of the written proposals, final formal technical reports, and final oral presentations.

COURSE SCHEDULE (WINTER 2022)

Term Week No.	Week Starts	Tasks
1	Jan. 9	• Attend Course Orientation and Safety Lecture (mandatory) - see announcements page on course website. • Individually complete Course Orientation and Safety quiz on onQ by 10:00 pm EST on Tuesday, Jan. 11. • Students will be asked to provide a preference of team members at the course orientation lecture (attempts will be made to meet student preferences, however, a final decision will be made by the Course Instructor). • A list of team members will be posted on the onQ website soon after close of the course orientation quiz and you will receive email confirmation of your team from the Course Instructor. • Teams review list of available lab projects and submit a Project Preference Survey (one per team) via onQ by 2:30 pm on Thursday, Jan. 13 (attempts will be made to meet team preferences, however, a final decision will be made by the Course Instructor). • Project assignments will be posted on the course website on the evening of Thursday, Jan. 13. • Teams should meet to establish ground rules for the team. • Begin project documentation in lab book. • Contact 1st Project Supervisor to arrange preliminary meeting. • Prepare for first meeting with Supervisor.
2	Jan. 16	• Preliminary interview with Supervisor to clarify project definition. • Begin work on letter of proposal. • Contact Project Supervisor to schedule proposal meeting. • Submit a letter of proposal for review via onQ by 4:00 pm EST the day before you plan to orally present the proposal to your Supervisor. • Meet with Supervisor to present and discuss proposal. Receive advice for changes to the proposal and/or receive approval. • Begin experimentation/modeling when approval granted by Supervisor.
3	Jan. 23	• If proposal is approved, groups will perform in-lab work in-person according to protocols specified in the lab manual document "12. Laboratory Work Modes & COVID Safety Protocols". Any group member that cannot attend lab work in-person must participate in lab work via a Zoom meeting video link on an in-person member's laptop pc during the scheduled lab time.
4	Jan. 30	• On-going experimentation/modeling. • Continued analysis of results and report preparation.
5	Feb. 6	• Complete experimentation/modeling. • Finish analysis of results and report preparation.
6	Feb. 13	• Submit one Group-prepared Final Formal Technical Report (with appended summary of member contributions) via onQ by 5:30 pm EST on Sun., Feb. 13. • Final oral presentation (via Zoom meeting with Course Instructor and Project Supervisor) prepared and presented equally by all group members (schedule may be viewed in the "CHEE 420 Course Manual" module of the course onQ website). • Presentation slides (.pdf or .pttx) must be submitted via onQ before the scheduled presentation time.

COURSE SCHEDULE CONT'D (WINTER 2022)

Term Week No.	Week Starts	Tasks
7	Feb. 27	• Contact Project Supervisor to arrange preliminary meeting. • Prepare for first meeting with supervisor. • Preliminary interview with supervisor to clarify project definition. • Begin formulating letter of proposal. • Contact Project Supervisor to schedule proposal meeting.
8	Mar. 6	• Submit a letter of proposal for review via onQ by 4:00 pm EST the day before you plan to orally present the proposal to your Supervisor. • Meet with Supervisor to present and discuss proposal. Receive advice for changes to the proposal and/or receive approval. • Begin experimentation/modeling when approval granted by Supervisor.
9	Mar. 13	• If proposal is approved, groups will perform in-lab work in-person according to protocols specified in the lab manual document "12. Laboratory Work Modes & COVID Safety Protocols". Any group member that cannot attend lab work in-person must participate in lab work via a Zoom meeting video link on an in-person member's laptop pc during the scheduled lab time.
10	Mar. 20	• On-going experimentation/modeling. • Continued analysis of results and report preparation.
11	Mar. 27	• Complete experimentation/modeling. • Finish analysis of results and report preparation.
12	Apr. 3	• Submit one Group-prepared Final Formal Technical Report (with appended summary of member contributions) via onQ by 5:30 pm EDT on Sun., Apr. 3. • Final oral presentation (via Zoom meeting with Course Instructor and Project Supervisor) prepared and presented equally by all group members (schedule may be viewed in the "CHEE 420 Course Manual" module of the course onQ website). • Presentation slides (.pdf or .pttx) must be submitted via onQ before the scheduled presentation time.

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 Zoom 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.