CHEMICAL ENGINEERING 4L03

Advanced Laboratory Skills

Course Syllabus

Instructor: Timothy W. Stephens

Table of Contents

1 – Course Outline

	Name:	Contact:
Instructor:		
	Tim Stephens	Stepht2@mcmaster.ca
Teaching Assistants:		
	Ahmad Abou-Hawach	abouhawa@mcmaster.ca
	Kholoud Abousalem	abousalk@mcmaster.ca
	Sorour Ayoubian Markazi	ayoubias@mcmaster.ca
	Lina Hamed	hamedl@mcmaster.ca
	Mahdis Nankali	nankalim@mcmaster.ca
	Samuel Ogunniyi	ogunniys@mcmaster.ca
	Olivia Pilla	pillao@mcmaster.ca
	Derek Zhang	zhanz192@mcmaster.ca
Technical Staff:		
Teaching Lab Co-Ordinator	Tim Stephens	JHE A106 – ext. 24958
Lab Safety Co-Ordinator	Lisa Laframboise	JHE 136 – ext. 24014
Machine Shop	Justin Bernar	JHE 140 – ext. 24880
Electronics and Instrumentation	Mike Clarke	JHE 251 – ext. 24959

1.1 Course Description

The course consists of a series of three 3-week laboratory projects in the areas of mass transfer, process control, biotechnology, polymer processing, and industrial-scale operations. Results from prescribed experiments as well as self-directed learning modules and/or techno-economic analyses will be presented through formal write-ups. There will also be bi-weekly lectures for the first third of the course.

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with an explanation and the opportunity to comment on changes. It is the responsibility of the students to check their McMaster email and the course Avenue site weekly during the term and to note any changes.

1.2 The P.R.O.C.E.S.S.

As some of you may already be aware, the department of Chemical Engineering has a storied history of education. In addition to teaching and learning, the department is proud of our graduates not only for their academic success, but their more intrinsic traits that make them respected members of the engineering community.

Recently, several high-ranking graduates from the McMaster Chemical Engineering Program employed in various industries (oil/gas, financials, *etc*.) were interviewed to ask what traits they look for when hiring for engineering positions. Using this information, the department would like to present to you the **PROCESS**: a code of conduct that we hope will guide our students throughout this program and their careers to come.

- **P**rofessionalism
- **R**esponsibility
- **O**wnership
- **C**uriosity
- **E**mpathy
- **S**elflessness
- **S**ervice

It is up to YOU to interpret these traits and apply them to your time at McMaster and your career as you see fit. These traits will not be assessed for grades but will be strongly encouraged throughout your time at McMaster. We hope that you identify with these character traits and what they mean to you, and that you **trust the process**.

1.3 Course Objectives

The laboratory sessions, lectures, and review meetings are planned to:

1. Provide practical experiments that illustrate the fundamental ideas from prior chemical engineering courses
2. Give practice in realistic measurement and interpretation of data using statistical techniques
3. Act as an educational precursor to ChE 4C03 (engineering stats), ChE 4G03 (optimization), CivE 4V04 (wastewater treatment), ChE 4E03 (process control II), and ChE 4M03 (separations)
4. Give experience in analyzing relevant industrial scale equipment
5. Give practice in formulating questions in the form of scientific hypotheses and investigating these hypotheses using laboratory equipment
6. Give practice using the literature (textbooks, handbooks, journals, and vendor information)

7. Give practice with manual laboratory skills and laboratory equipment
8. Give first-hand experience in safety assessment of experimental work
9. Give practice in the preparation of formal written reports
10. Give practice in verbal technical discussions, both formal and informal
11. Give practice using technical communication and problem-solving skills

It is expected that the laboratory experiments and reports will be carried out in more depth and technical detail than in ChE 3L03. Problems will be more open-ended, and it will be necessary to formulate objectives that can be achieved using the equipment provided. The self-directed learning (SDL) component of the lab is significant in ChE 4L03, with background preparation expected and formal hypotheses/experimental plans to be completed for each experiment.

1.4 Course Texts

REQUIRED – ChE 4L03 Custom Courseware (print at your own convenience)

NOTE:

- Some special material for some experiments may be required (provided in-lab or on the Avenue site for the course).
- For writing technical reports, please refer to Bliqc & Moretto "Technically-Write!" Prentice Hall. This text has been used previously for ChE 2G03 & 3L03 and copies are available in Thode library.

1.5 Course Organization:

Table 1: Lecture and Lab section dates and times.

	Day:	Start Time:	End Time:	Room:	MS Teams Code:
Lecture C01	Tues & Wed	9:30 AM	10:30 AM	BSB 106	Through A2L
L04	Monday	1:30 PM	4:30 PM	JHE A106	cy7raem
L01	Tuesday	1:30 PM	4:30 PM	JHE A106	avpewsa
L02	Wednesday	1:30 PM	4:30 PM	JHE A106	vd5esy2
L03	Thursday	1:30 PM	4:30 PM	JHE A106	4jio6uw
L05	Friday	1:30 PM	4:30 PM	JHE A106	a12kjhs

1.6 Laboratory sessions

Students will work in groups of 3 to 5; each student will get experience working on real equipment, analyzing and presenting data in a formal environment and working in groups.

Report guidelines are included in a separate document. Students must complete all tasks for the experimental period by the end of the lab session. No one will be permitted to stay in the laboratory past this time. With Instructor approval, students may be allowed to come in before the original start time of the lab. The TAs & the Instructor will be available in the lab throughout each lab session for questions. The instructor will be available for consultation by appointment. Permission from the course instructor will be required for any changes in the schedule. Students must attend all laboratory periods; exceptions are only allowed with an MSAF or similar documentation.

Approved absences in a cycle must be compensated. For *one* missed lab day in a cycle, the student must plan with their team members to cover work on reports and progress logs OR arrange to collect data with a different lab group, on the same week where feasible. Permission of the course instructor is required for either option.

For *two* approved absences in one cycle, the student may arrange to collect data with another group on two other days, if feasible. If not feasible, the student will complete a make-up lab during the week of Nov 24th and will submit an individual **SR**, independent of their group, based on collected data. If the absences occur in Cycle 3, the student will still be required to participate in the group presentation OR submit an alternate assignment. Permission of the instructor is required for any of these options.

1.7 Lectures

Lecture periods are devoted to the development of experimental design and analysis skills applicable both to this course and any technical experimental setting. Lecture notes for these sessions are posted on Avenue to Learn for download. The lectures are designed such that they will be of benefit to improving your mark in this course and by progressing/solidifying translatable job skills. There will be several guest lecturers throughout the course. These are individuals with expertise in an area relating to one of the 6 experiments.

Table 2: Overall Course Schedule (Some Lecture topics TBA)

Week of:	**Lab:**	**Reports Due: (Details in Section 1.8)**	**Lectures (Tue and Wed) and Topics**
Sept. 2nd – 5th	No Lab		**Sept 2:** Course Introduction & Safety **Sept 3:** Writing Lab Reports I
Sept. 8th – 12th	Cycle 1 W1	PL1 C1	**Sept 9:** Writing Lab Reports II **Sept 10:** Error and Experimental Design
Sept. 15th – 19th	Cycle 1 W2	PL2 C1 & OLP C1	Sept 16: **Dr Jake Nease,** Process Control I Sept 17: Process Control II
Sept. 22nd – 26th	Cycle 1 W3		**Sept 23: Dr. Peter Margetts, Hemodialysis** **Sept 24:** TBA
Sept 29th – Oct. 3rd	No Labs		No Lectures
Oct. 6th – 10th	Cycle 2 W1	FR1 PL1 C2	TBA
Oct. 13th – 17th	Midterm recess	-	-
Oct. 20th – 24th	Cycle 2 W2	PL2 C2 & OLP C2	TBA
Oct. 27th – Oct. 31st	Cycle 2 W3		TBA
Nov. 3rd – 7th	Cycle 3 W1	FR2	TBA
Nov. 10th – 14th	Cycle 3 W2	PL1 C3	**Nov 15**: Giving Effective Presentations
Nov. 17th – 21st	Cycle 3 W3	PL2 C3 & OLP C3	
Nov. 24th – 28th	**Cycle 3 Presentations** Make up Week	PRS Slides Submitted PRS given	
Nov. 30th – Dec. 5th	**Cycle 3 Presentations** Make up Week	SR Due	

1.8 Course Assessments and Grading

The course will be graded based on the following scheme:

Table 3: Course assessment weight distribution.

Evaluation:	Weight (%):
Assignments And Guest Lectures	10%
Cycle 1 Laboratory Full Report (*Individual*)	30%
Cycle 2 Laboratory Full Report (*Group*)	30%
Cycle 3 Laboratory Short Report (*Group*)	15%
Cycle 3 Presentation (*Group*)	15%

Report Marking Summary (out of overall grade):

Table 4: Laboratory cycle assessment weight distribution.

Evaluation:	Weight (%):
Two Progress Logs (PL1 & PL2)	3% (1.5% each)
Open Lab Day Plan (OL)	1.5%
Lab Preparation	1.5%
Full Report (FR1 and FR2) (Cycles 1 & 2)	24%
Short Report (SR) (Cycle 3 only)	12%
Presentation (PR) (Cycle 3 only)	12%

Each student will do three laboratory experiments, each taking 3 weeks. The various experiments are listed at the end of this course outline. Unlike in 3L03, you can indicate some preference for which experiments you would like to do. This sign-up sheet will be made available during the first week of classes.

Grading Rubrics for the above are posted on Avenue to Learn. Rubrics for FR and SR are similar to those used in 3L03 and are set on an ‘up to par’ basis.

Final grades will be converted to the 12-point scale using the Senate recommended conversion scale.

Lab Preparation:

To achieve full marks in this section*, individual* students must show the TA:

- Excel spreadsheet and or experimental tables ready for experimental data input
- Smooth transition into the laboratory experiments with minimal TA assistance
- Punctual and ready to start at the beginning of the laboratory scheduled time
- Active participation in lab activities
- Demonstrated knowledge and understanding of lab manual content

Progress Log

A Progress Log (PL) must be submitted following the completion of the week 1 and week 2 laboratory sessions. These are to be uploaded to the group Microsoft Teams Channel and will be graded your Week 1 TA. For example, you have TA-4 in cycle 1-1 and TA-7 in cycle 1-2, then PR 1-1 and PR 1-2 both go to TA-4. The purpose of the PR is to oblige you to start the data analysis (rather than right before the formal report is due) and ensure you are on the right track in performing the experiment. PRs are always to be submitted as a group, not individually. The 2 PL components will account for 3 marks of the 30 marks assigned for the lab report.

PL Format:

1. **Clearly list the following:**
    a. Experiment title and date
    b. Group members with respective student numbers & McMaster email addresses
2. **In 500 words or less clearly state the following:**
    c. Objectives examined this day
    d. Methods used (very brief – **only necessary if procedure deviated from manual procedure**).
    e. Preliminary results presentation and discussion

The progress log should not exceed 2 pages of text and 2 pages of figures/tables, exclusive of appendices.

Include raw data tables or figures as specified in the individual lab write-ups. Figures and/or tables should include appropriate statistical analysis; for example, y (flow rate) is linear in x (rotameter setting) as $y = mx + b$ with a correlation coefficient of $R^2 = 0.98$, m = ... ± 95% Confidence Interval and b = ... ± 95% Confidence Interval. The corresponding 'preliminary discussion' could be as brief as: "Flow rate is linear with volumetric flow rate with an $R^2 = 0.98$". Use regression analysis; 'trendline' is not acceptable (except for drawing the line of curve on the figure). Data spreadsheets may be submitted as part of your raw data in Appendix. Reporting the R^2 is insufficient as an independent statistical metric; confidence intervals and/or Standard Error (SE) should always

be used in accordance with an error propagation analysis. Interpreting ANOVA tables and using these statistical methods will be outlined in the in-class lectures. It is strongly recommended that sample calculation be included in the PL Appendix.

PL is due by 11:59 pm <u>two</u> days following the laboratory session. You MUST upload the PL to the group Teams Channel. An electronic copy of your graded PL will be returned to you before the beginning of the following lab session to help you with the preparation of your formal report.

Open Lab Plan:

The third lab day of each cycle is an Open Lab Day in which students are given the opportunity to determine their own lab activities.

Some examples of such activities include:

- Complete any lab measurements not completed in Weeks 1 and 2;
- Carry out further measurements to establish trends more clearly.
- Self-Directed Learning (SDL), where you will test one or more variables not examined in weeks 1 or 2.
    - These may include changes to operating parameters, use of different sensor, different feed material, or comparison of collected data to simulations.

The group is asked to discuss with their plan with the supervising TA during lab day 2. The proposed activities must cover 1.5 to 3.0 hours of lab time.

Open Lab Plan Format:

1. **Clearly list the following:**
    a. Experiment title and date
    b. Group members with respective student numbers & McMaster email addresses
2. **Then in state the following:**
    c. A specific description of what lab testing you intend to carry out.
    d. A brief summary of the tasks and methods you will use to carry out the lab-work.
    e. The specific rationale behind the lab work, such as what trend are you trying to clarify or what new insight are you trying to obtain.
    f. An approximate timeline for completing the tasks

The total length **should not exceed two pages** and is **submitted along with PL2 to the Microsoft Teams group channel**. The Open Lab Plan is always submitted as a group. It is 1.5 marks out of the 30 marks of the report.

Formal Reports:

The first lab will require an *individually completed*, **12-page Full Report (FR1).** The second lab will require a *group completed* **12-page Full Report (FR2).** The third lab will require a *group* **7-page Short Report (SR)** and a *group* **Lab Presentation (PRS)**.

All reports are to be computer generated, i.e. no hand-written reports allowed. All reports are to be submitted to: Avenue to Learn. Electronic copies of reports must be uploaded no later than 11:59 pm (before midnight) on the specified deadline date to Avenue to Learn. A standard deduction of **5% per day** (starting at midnight) overdue applies; for example, a report awarded 75% but handed in 1 day late will receive a grade of 70%. The late penalty will be waived only on the presentation of an MSAF or similar. All reports and the presentation must be completed and handed in for course credit. Failure to hand in any one laboratory report or presentation will result in automatic course failure.

Laboratory reports will be marked according to the guidelines for report writing and the detailed grading scheme included in this courseware package. Reports are expected to be clear and concise.

Cycle 1 Full Report (FR1) – Individual:

A Formal lab report consisting of a Title Page, Table of Contents, Introduction, Materials and Methods, Results, Discussion, Conclusion, References, Appendices and Pledge of Originality. The main body of the report (Intro → Conclusion) is a 12-page maximum, including figures and tables, but not including Title Page, Table of Contents, References, and Appendices It must be written with 1.5 line-spacing, 11 font Times New Roman. *Text in Individual Reports must be original and not copied and pasted from group PL's, including written sections, figures, tables and captions.* The Cycle 1 Report is due at 11:59 PM, 14 days after the completion of Week 3.

Cycle 2 Full Report (FR2) - Group:

A Formal lab report consisting of a Title Page, Table of Contents, Introduction, Materials and Methods, Results, Discussion, Conclusion, References, Appendices and Pledge of Originality. The main body of the report (Intro → Conclusion) is a 12-page maximum, including figures and tables, but not including Title Page, Table of Contents, References, and Appendices. It must be written with 1.5 line-spacing, 11 font Times New Roman. The Cycle 2 Report is due at 11:59 PM 8 days after the completion of Cycle 2 Week 3.

Cycle 3 Short Report (SR) – Group:

A short lab report will contain Title Page, Table of Contents, Results, Discussion and Conclusion sections. Appendices and References must be included. A Pledge of Originality must be included. The main body of the report (Results → Conclusions) has a 7-page maximum, inclusive of figures and tables, and should be written in 1.5 line-spacing, 11 font Times New Roman. The Short Report is due on or before December 4th at 11:59 PM.

Cycle 3 Presentation (PRS)- Group:

A 20-minute presentation based on the completed experiment. See detailed instructions below.

Reports exceeding page limits will be penalized, and excess pages will not be marked. Presentations exceeding time limits will not be graded beyond the cut-off.

Pledge of Originality:

A written Pledge of Originality must accompany every full report (FR) and short report (SR) submission. The pledge should use the provided template (A2L), signed by the author(s), and appended to the full report (in the same PDF file after the last appendix). Submission without the Pledge will not be graded and **late submission of the Pledge is subject to a 5% penalty**.

Students will have the opportunity to review their graded reports with their TA. Senate regulations require that the instructor must retain file copies of the graded reports. These marks are tentative and may be raised or lowered by the instructor to account for differences in the TA's grading styles.

Laboratory Presentation Format (PRS):

A 20-minute in-person presentation (PRS) will be conducted in groups on the results of the Cycle 3 labs starting in the second week after the end of Cycle 3. The 20-minute deadline will be strictly enforced. The group presentation will be followed by a 10 – 15-minute question period.

The presentation must be given on Microsoft Power Point and will be given in-person. The presentation (in pdf format) must be **submitted on Avenue to Learn** 1 day prior to the presentation. The peer evaluations must be completed no later than 3 days after the presentation. A schedule for presentations will be posted on Avenue to Learn closer to the date.

The presentation must contain an Introduction, Experimental, Results, Discussion, Conclusions and References. Due to the short (20-minute) nature of the presentation, students must carefully select which slides and information to include.

The group presentation mark may be adjusted for individual students in the group according to each student's performance during the presentation. The presentation will be marked according to the detailed grading scheme included on Avenue to Learn and the guidelines to be discussed in the lecture period. The PRS will account for 12% of the final course grade. The average score of the peer evaluations may adjust each student's final presentation grade.

Mark Penalties:

Grade Penalties are applied to written reports for cases of absence without leave, late submissions, and conduct issues:

- Lateness to lab of more than 15 minutes: 2% penalty to lab report (after 2nd incident)
- Single Absence from lab without MSAF or alternate arrangement: 10% penalty to lab report.
- Multiple unapproved Absences in one Cycle: zero on written report
- More than 3 hours missed in any cycle without approval: zero on lab report
- Leaving lab before your group mates for non-valid reason: 5% penalty to lab report per incident.
- Leaving Lab space in poor condition or failure to exit before 4:30 PM: 5% penalty to lab report.
- Unprofessional Conduct: up to 10% penalty to lab report
- Handing Report in Late: 5% per day, starting at 12:00 midnight
- Handing in Pledge of Originality Late: 5%

Peer Evaluations and Feeback:

It is expected that group members will contribute an equal share on reports, progress logs, open lab plans and lab work. By default, each group member will receive the same grade on any group submission unless Peer Adjustment indicates otherwise.

A Peer Assessment Form must be submitted following each full report submission by each student (using a survey posted on A2L). The Form is submitted to a separate folder on A2L, ensuring that its contents are confidential to other students, and it will be due within 72 hours of the report deadline. Students are asked to evaluate every member's contribution to the group work in the Form. The information will be used to determine whether grade adjustment is needed. For FR2, peer adjustment will only apply to the PL and OLP sections, which are group activities. *Feedback is confidential between individual students and their TA*.

If a student does not submit the form by the deadline, they relinquish their right to claim contribution to the group work. Their contribution will be determined from forms submitted by other group members.

Lab Structure and Schedule:

Lab sessions are organized in three-week Cycles. Each cycle has three 3-hour sessions. The first and second session have specific goals and endpoints that will be directed by the TA and manual. There is a Make up week following Cycle 3 if extra sessions are needed due to weather cancellations or lab closures. The Make up week may also be used for students who missed multiple sessions due to extenuating circumstances; permission of the instructor is required to arrange this.

The third session is an Open Lab/Self-Directed Learning (SDL) in which your group will plan and carry out one

or more informed, knowledge-based learning goals. Details of the Open Lab activity and submission are provided above.

A schedule indicating all key laboratories, lectures, and meeting slots relevant for each lab section is included in this course package. Students will NOT be permitted to switch lab sections after completing the first laboratory session.

Assignments and Guest Lecture Attendance

Assignments are due no later than 11:59 pm on the specified dates, submitted through Avenue to Learn. Late assignments will NOT be accepted. Excused lateness must be worked out with the instructors **before** the assignment is due or submit a McMaster Student Absence Form (MSAF). A total of two assignments worth 5% will cover topics that are general to the course material and not a specific experiment. A valid MSAF, will allow an extension of up to 5 days on the assignment due date.

Several Lectures will be given by experts in specific areas of chemical engineering; attendance at these lectures will be recorded and count towards a5% the final grade. The dates of and topics of these lectures will be posted on Avenue to Learn.

Disputes and Resolution

Challenging the Grade:

Reports can only be re-graded in their entirety: i.e., it is not possible to change the mark of one attribute in the rubric without reviewing all the others. Therefore, it is possible for the grade to get lower after the grade-challenge process. Because of the amount of time required, reports can only be re-graded if there is sufficient evidence that the error or unfairness of the original grading has a substantial effect on the grade. To meet this requirement, you will need to follow the procedure below.

1. Review the whole rubric and identify all attributes where the mark is challenged.
2. For each of these attributes, identify which mark you think your report deserves and provide your justifications (based on the rubric).
3. Add the mark changes from all these disputed attributes and only submit your request if the total potential change is more than 5 marks.
4. If it is a group report, obtain the consent from all group members. Copy all group members on the e-mail.
5. Submit your request in writing (including all justifications) to the grading TA by E-mail within 7 calendar days after the report was first returned to the submitter.

Disputes in Group Work:

Collaboration is an important skill to be developed in this course. Students are strongly advised to commit to their obligation to the group, behave professionally in the collaboration, and effectively communicate with one another to allocate the workload and resolve any disputes. In case of any irreconcilable dispute, **the report and/or presentation must still be submitted/given on time, and the disputes are only resolved after submission**.

Unequal Contribution:

If one or more members have not contributed equally to the experiment and report, the grades will be adjusted according to the relative contributions of the members. Contributions are evaluated based on the peer assessment completed by the group members. In case of significant discrepancy between information provided by members of a group, the TA or Instructor will investigate contributions by the members based on evidence such as raw and processed data, communication record, and any draft writings. It is thus important for all members to keep a record of their contributions and avoid access to key files by the alleged non-contributor(s). Group members and the supervising TA may also be interviewed during the investigation.

Unprofessional Conduct:

In addition to the lack of contribution, other unprofessional behaviors from certain group members may impede or even sabotage the progress of the group. Examples include but are not limited to:

- holding on to important data, analysis, or text contributions and refusing to share with groupmates or not responding to such requests
- not providing "agreed upon" work and failing to notify the other members until it is too late to make up for
- rude, demanding or inconsiderate behavior in person or online, especially if this behavior discourages discussion, learning and collaboration
- Spending excessive time during lab on non-lab activities (i.e. checking social media)

Important notes:

- Except under severe extenuating circumstances, there is no excuse for not responding to or communicating with groupmates.
- Even if the student is permitted by the instructor to miss any work with legitimate documentation, they are still obliged to notify and coordinate with other group members to ensure the smooth transferring of data, information, and responsibilities.

The burden of proof lies with the other members of the group. After reviewing the evidence submitted, the instructor may impose extra penalties for unprofessional conduct in addition to that for the lack of contribution.

1.9 Senate and The Faculty of Engineering Policies:

Centre for Student Development:

"Students with disabilities can receive accommodations to assist them in the completion of their assignments and exams. Please contact the Centre for Student Development for advice and for arranging assistance." Further info at: ***http://csd.mcmaster.ca***

"The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem, that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible."

1.10 Plagiarism and Academic Dishonesty:

Plagiarism is a serious issue to you as an academic and a future professional and will be treated as such in this course should it occur. You will be using Avenue to Learn, which is Turnitin.com enabled, to verify the originality of your laboratory reports throughout the course. Please note the following for Turnitin.com:

1. An originality report will be generated and reviewed by the instructor.
2. Generation of the originality report may not be available until after the report is due.
3. As several years of reports on similar laboratories are in the database, it is inevitable that some identical phrases or expressions may occur between your report and previous reports – this is to be expected. We are not looking for a particular percentage of 'originality' but rather looking through the full originality report to confirm the laboratory report is your original work.

Please refer to the university policy on academic dishonesty (reproduced below) for the definition of plagiarism as it pertains to this course: Please note that plagiarism cases *will be reported* and the procedures outlined below *will be followed* if an issue were to occur.

"You are expected to exhibit honesty and use ethical behavior in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity."

"Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behavior can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university."

"It is your responsibility to understand what constitutes academic dishonesty. For information, the various types of academic dishonesty please refer to the Academic Integrity Policy, located at: http://www.mcmaster.ca/academicintegrity"

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained. *
2. Improper collaboration in group work. *
3. Copying or using unauthorized aids in tests and examinations.

**In particular, in this course, copying previously submitted laboratory reports or data is considered to be an extreme case of academic dishonesty/plagiarism.*

In this course, we will be using Turnitin.com and Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, usernames for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used.

Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

A note on the use of Generative AI:

Students are NOT permitted to use generative AI to compose reports or assignments in this course. In alignment with McMaster academic integrity policy, it "shall be an offence knowingly to . . . submit academic work for assessment that was purchased or acquired from another source". This includes work created by generative AI tools. Also stated in the policy is the following, "Contract Cheating is the act of 'outsourcing of student work to third parties' (Lancaster & Clarke, 2016, p. 639) with or without payment." Using Generative AI tools is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity. For more information on the definition of and McMaster's policy towards generative AI, refer to https://provost.mcmaster.ca/office-of-the-provost-2/generative-artificial-intelligence/

2 ─ Laboratory Safety and Safety Checklist

An overview of the principles of laboratory safety will be given in the first lecture. You are responsible for familiarizing yourself with the experiment prior to entering the laboratory to gain a preliminary understanding of the key safety issues associated with each experiment. On the first day of an experiment, your instructor or teaching assistant will be available to answer any questions that you may have about the experiment to be done. It is important that you fully understand any hazardous features of the experiment. For example:

a) Pressure, vacuum experiments

- Correct operation and handling of gas cylinders Need for eye protection with glassware Pressure limitations with large vessels
- Pressure limitations of tubing

b) Acids and bases Corrosion and burns

- Heat effects (e.g. sulfuric acid and water)
- Gloves required

c) Organic liquids

- Volatility and toxicity (fume hood or other special precautions needed?)
- Flammability – location of the nearest fire extinguisher

d) Electrical equipment Check for frayed wires

- Avoid wires trailing on the floor, Keep wires away from water

e) Large scale equipment Safe use of ladders

- Safe access to control points
- Do not climb on or roll equipment
- Correct start-up procedures
- Location of Emergency Shutdown Switch

f) Shut down of equipment

- Ensure that all equipment is completely shut down in a safe sequence at the end of each lab period. Do not leave dangerous materials lying in the open. Ensure that valuable small items (stopwatches, pipettors) are not left in the open. Ensure any hazardous material is placed inside designated containers.

No food, drink, or smoking is permitted in the laboratory areas. Coats and bags must be left in the antechamber of JHE A106 and safely out path of foot traffic. Protective eyewear must be worn – no exceptions.

Safety infractions will normally be dealt with as follows**:

- **First** infraction –oral warning
- **Second** infraction – written warning
- **Third** infraction – failure on that laboratory
- **Fourth** infraction – withdraw and course failure

***This order may not be followed depending on the seriousness of the student's action and will be left at the discretion of the course instructor.*

In case of emergency:

- **Remain Calm**
- **Dial 88** from a campus phone
- **Dial (+1) 905-522-4135** from a cell phone (security services direct)

In case of fire, smoke or gas:

- Pull the fire alarm
- Dial **88** or **905-522-4135**
- Leave the building
- If the fire alarm sounds:
- Leave the building
- **Do not** re-enter the building until the fire department or security approves

Familiarize yourself with the location of the nearest fire extinguisher, safety shower and eye wash station.

Prior to each experiment, you will have to complete the safety checklist (distributed in the lab), as shown on the following sheet. Read the protocols for your lab carefully prior to entering the lab to become familiar with all the hazards of the experiment and assist in completing this safety form.

2.1 ChE 4L03 SAFETY CONSIDERATIONS*

Name and Student No.:_____ Instructor:_____ Date: _____

(To be completed in the laboratory before experimental work can begin on a new project.)

Laboratory Equipment:

Fill in the key safety concerns and actions to be taken with respect to potential hazards in the following areas:

1. Pressure/Vacuum:

2. Chemicals:

3. Electrical Equipment:

4. Large-scale Equipment:

5. Start-up and Shutdown of Equipment:

6. Other:

If you perceive that you may be taking an unsafe action or are in an unsafe situation, inform the teaching assistant or instructor.

I have received instructions in and understand the safety issues associated with this experiment.

Signature:_____ Date:_____

*Available in the lab prior to each new laboratory.