



# CHBE GRADUATE STUDENT HANDBOOK

2021

## OVERVIEW

This Graduate Student Handbook is prepared for all incoming and current graduate students at the Department of Chemical and Biological Engineering at the University of British Columbia. It is designed to help guide students through their program by providing in-depth information on policies, procedures, and program milestones.

[CHBE Graduate Office](#)

206 – 2360 East Mall, Vancouver, BC, V6T 1Z3



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## WELCOME MESSAGE

### *Welcome Message from the Department Head*



Congratulations on joining the Department of Chemical and Biological Engineering (CHBE) at the University of British Columbia (UBC). You should be proud! UBC is ranked as one of the top 40 Universities in the World, most recently by the [Times Higher Education](#), and the quality of our CHBE Department, its faculty and staff, and its entire student body are an important reason why. As a graduate student within our Department, you will join colleagues who are conducting field-defining research that is providing solutions to many of the World's most pressing challenges - green technologies and processes to convert renewable natural resources into the vast array of products currently required by society, advanced fuel cells, batteries and photovoltaics that provide clean energy while reducing use of gasoline and other fossil fuels, and the discovery and manufacture of revolutionary chemicals and materials that will help ensure a sustainable society and planet.

Researchers within the CHBE Department are also pioneering next-generation pharmaceuticals, medical devices and drug-delivery systems needed to improve human health in ways that also reverse currently skyrocketing healthcare costs, as well as advanced technologies for providing clean drinking water and safe foods to all people, including those living in the most impoverished countries and communities. And I've merely scratched the surface of what we do and provide. Each day, the CHBE Department and the terrific

talent within it are providing innovative solutions for this and future generations.

Our core mission is to fully prepare you to be leaders of industry and society. Developing your research and development capabilities, advanced technical and problem-solving skills, ability to effectively and persuasively communicate, and understanding of how to best serve society are our focus. The broad and potent set of skills you will acquire will therefore position you for a productive career in industry, government or academia. Indeed, those skills are highly valued by an ever-increasing range of companies - clean energy and transportation, advanced materials, biotechnology, micro- and nano-machines, healthcare and pharmaceuticals, chemicals and advanced materials, foods, and mining and forest products represent just a few important examples. This is one reason why the Federal Reserve Bank and the U.S. Census Bureau recently reported that [Chemical Engineering ranked 1<sup>st</sup> among all college majors in terms of both highest starting salary and highest median salary mid-career](#).

Constantly improving your engineering skills and value to society are our guiding principles, and as a student in one of our graduate degree programs you will see those principles at work not only in our classrooms, but also in our research laboratories, community and industry partnerships, entrepreneurial ventures, student organizations, and outreach activities. Our graduates are recognized leaders of industry and academia, and many hold patents for cutting-edge technologies or have formed thriving companies based on their research and inventions while at UBC.

We are fully committed to constantly improving graduate student training. The CHBE Department is therefore implementing exciting new initiatives to further improve your technical skills, to provide opportunities to use those skills to solve real problems facing industry and society, and to leverage powerful machine learning and data science tools to train you in the advanced computational skills needed to give you a competitive edge. We recognize data science will make ever important contributions to our capacity to do ground-breaking engineering, and we are committed to being positioned at the forefront of that revolution.

Please explore our [website](#) and learn how the CHBE Department is providing the people, knowledge and innovations needed to solve many of society's most pressing problems.

Charles Haynes, PhD, P.Eng., FCAE, FRSC  
Head, Department of Chemical and Biological Engineering  
Professor and Canada Research Chair in Interfacial Biotechnology



## 1. INTRODUCTION

### 1.1 ABOUT THIS HANDBOOK

This handbook provides guidelines, instructions and stepwise advice for graduate students of the Department of Chemical and Biological Engineering. The Department graduate programs adhere to the policies and regulations of the Faculty of Applied Science and the Faculty of Graduate and Postdoctoral Studies (G+PS) at the University of British Columbia

Rules and regulations governing graduate programs may change and it is important to consult the G+PS website (<https://www.grad.ubc.ca/>) for current requirements. Each graduate student has the ultimate responsibility in ensuring that their program of study satisfies all current requirements.

### 1.2 ABOUT CHBE

Chemical and Biological Engineering (CHBE) at the UBC Vancouver campus is one of the six departments of Engineering at UBC, all of which are in the Faculty of Applied Science (APSC).

The Department has a global reputation for excellence in its accredited undergraduate programs, for innovative research and for the quality of its graduates and faculty. The Department has 35 full-time faculty and 15 staff members supporting over 440 undergraduate students, and 150 graduate students; and also lends its support to our postdoctoral fellows and research associates. Our accredited undergraduate programs lead to Bachelor of Applied Science degrees in Chemical Engineering and in Chemical and Biological Engineering. The Department's graduate programs lead to the research thesis streams of Master of Applied Science (MASc), Master of Science (MSc), and Doctor of Philosophy (PhD), as well as the professional streams of Master of Engineering (MEng) and Master of Engineering Leadership (MEL) in a number of areas of specialization within chemical and biological engineering.

The Department is actively engaged in a wide range of applied research aimed at advancing society through the application of chemical and biological engineering. Details regarding some of those research efforts can be found on our department website (<https://www.chbe.ubc.ca/>).

#### 1.2.1 Vision Statement

To educate in the engineering discipline and conduct research to serve the people of BC and the world in an environment that fosters research breakthroughs and teaching innovations, while also supporting student, faculty and staff success and professional advancement.



### 1.2.2 Mission Statement

The Department of Chemical and Biological Engineering is committed to:

- a) Providing outstanding undergraduate and graduate degree programs, and educating engineers empowered with excellent technical and leadership skills, integrity, and social responsibility.
- b) Being recognized internationally as a leader in research and engineering science, creating novel and sustainable solutions to serve public interests and to address global challenges in areas such as health, energy, and the environment.
- c) Ensuring an inclusive, safe, collaborative and respectful community for learning and work.

### 1.2.3 Core Values

As members of the Department, we are committed to our core values:

- a) Collegiality: Promoting cooperative interaction between colleagues, shared workload, and responsibilities.
- b) Excellence: Attracting the best and being recognized as a leader in teaching, research and community engagement.
- c) Innovation: Achieving true breakthroughs in research and education that bring meaningful and lasting value to society.
- d) Integrity: Being honest and honouring our commitments and duties to society and the profession, while also being respectful to everyone with whom we work and interact.



### 1.3 KEY DEPARTMENT CONTACTS

|                 |  |   |
|-----------------|--|---|
| Department Head |  | Dr. Charles Haynes<br><a href="mailto:charles.haynes@ubc.ca">charles.haynes@ubc.ca</a>                      |
| Academic        | PhD Student Advisor & Associate Head                         | Dr. Savvas G. Hatzikiriakos<br><a href="mailto:savvas.hatzikiriakos@ubc.ca">savvas.hatzikiriakos@ubc.ca</a> |
|                 | MASc/MSc Student Advisor                                     | Dr. Elod Gyenge<br><a href="mailto:elod.gyenge@ubc.ca">elod.gyenge@ubc.ca</a>                               |
|                 | MEng Student Advisor   | Dr. Anthony Lau<br><a href="mailto:anthony.lau@ubc.ca">anthony.lau@ubc.ca</a>                               |
| Administrative  | Director, Academic Programs,<br>Administration and Resources | Marlene Chow<br><a href="mailto:marlene.chow@ubc.ca">marlene.chow@ubc.ca</a>                                |
|                 | Manager, Student Services                                    | Brittany Ji<br><a href="mailto:chbe.studentservicemanager@ubc.ca">chbe.studentservicemanager@ubc.ca</a>     |
|                 | Graduate Student Coordinator                                 | Kristi Chow<br><a href="mailto:chbe.gradoffice@ubc.ca">chbe.gradoffice@ubc.ca</a>                           |





## 2. NEW STUDENTS

### 2.1 GETTING STARTED

#### 2.1.1 Before You Arrive

- i. Review CHBE Welcome Package for New Graduate Students
- ii. Review [G+PS New Graduate Student Information](#)
- iii. If applicable, clear any G+PS Conditions of Admission in your online application. Instructions and guidelines can be found through your application portal.
- iv. If you are new to Vancouver, visit the G+PS page on [Life in Vancouver](#).

#### 2.1.2 When You Arrive at UBC

- i. Obtain a multipurpose [UBCCard](#) by pickup at the UBC Bookstore. The UBCCard identifies valid UBC students and provides Keyless entry to UBC buildings including the Chemical & Biological Engineering Building.

**Note:** Students must be enrolled in at least one course in order to be eligible for the Student UBCCard. Course registration information can be found here:

<https://students.ubc.ca/enrolment/registration/register-courses>

- ii. Submit necessary completed forms & documentation to the CHBE Graduate Student Office (CHBE Grad Office).

- Research Students (MASc, MSc, PhD) \*
  - [Social Insurance Number \(SIN\) Letter](#) (see [2.4.1](#) for details)
  - [Personal Data Form](#)
  - Passport (a copy of the personal info page & signature page)
  - A copy of UBCCard (2-sided)
  - CWL & [UBC Alumni Email](#)
  - Visa & Study Permit (international students only)
  - Review appropriate program learning outcomes (see Appendix A)

*\*For further details see Section 2.4, Finances*

- MEng Students
  - Passport (a copy of the personal info page & signature page)
  - A copy of UBCCard (2-sided)



- CWL
- Visa & Study Permit (international students only)

iii. Obtain CHBE Access for Research Students

- The CHBE Grad Office will coordinate a CHBE ID to access CHBE IT Resources online <http://www.chbe.ubc.ca> (**Login** through resources page)
- UBCcards are automatically activated to provide 24/7 Access to the CHBE building (main, 5<sup>th</sup> and 6<sup>th</sup> floors) for registered graduate students during normal building operating periods.  
[Access to labs](http://www.chbe.ubc.ca/resources/access-requests/) and restricted areas is requested online:  
<http://www.chbe.ubc.ca/resources/access-requests/>.  
Risk Management safety courses must be completed to gain access to labs and working spaces.
- Research graduate students who are working in CHBE Building Labs may be assigned a desk pending availability of space and an office key will be ordered for those who are located in the Chemical and Biological building.

iv. Get familiar with other facility/resource guidelines

- Computer Facilities: The department does not provide graduate student computer facilities. Students are encouraged to bring their own computers for academic and personal use. Wireless is available throughout the campus. Research supervisors may arrange for computer resources for their research groups and students.
- Mailboxes: Students are to use their own address for mail. The department does not provide mail services.

v. Attend [Graduate Student Orientation Events](#) on campus.

vi. Attend the CHBE Orientations and arrange meetings with the Graduate Office as advised.



## 2.2 INTERNATIONAL STUDENTS

### 2.2.1 International Student Guide

The International Student Guide at <https://students.ubc.ca/international-student-guide>, provides important information and documents that you are responsible for throughout your time at UBC, as well as the resources that can help you navigate life on campus as an international student. Topics covered include but not limited to: immigration, health insurance, working in Canada, taxes, and life beyond graduation.

If you have any questions related to your status as an international student, contact [International Student Development](#), or chat with an [International Student Advisor](#) on campus.

### 2.2.2 Student Visas

Individuals who are not Canadian citizens or Permanent Residents require a [Study Permit](#) to enter Canada to study.

## 2.3 REGISTRATION AND FEES

### 2.3.1 Registration

Graduate students must maintain continuous registration at UBC until the completion of their degree. Students who fail to register for two consecutive terms may be required to withdraw from their program. Registration information can be found at: <https://www.grad.ubc.ca/current-students/managing-your-program/course-registration>

### 2.3.2 Tuition

Tuition fee information is available at:

<http://www.calendar.ubc.ca/Vancouver/index.cfm?tree=14,266,773,1450>

Tuition payment options for graduate students can be found at:

<https://students.ubc.ca/enrolment/finances/paying-tuition>

Graduate students employed as a Research or Teaching Assistant may also apply to have tuition fees deferred: \* <https://webforms.students.ubc.ca/enrolment/finances/payroll-deferral>

*\*Fee deferments are not continuous and students submit requests annually for each new academic year.*



## 2.4 FINANCES

### 2.4.1 Social Insurance Number (SIN)

All research students must apply for a SIN prior to the start of their research. Please consult the following website for SIN information: <https://students.ubc.ca/enrolment/finances/taxes/social-insurance-number-sin>.

Procedures:

- i. Submit a request online at <http://www.chbe.ubc.ca/resources/letter-requests/> for a CHBE “**Employment Verification**” letter to support the SIN application. Application for a SIN is made *in person* at any Service Canada Office (Nearest location: 125 East 10th Avenue, Vancouver).
- ii. Applicants will receive an “Acknowledgment of SIN Confirmation”. Provide a copy of the letter to the CHBE Grad Office. A copy of your temporary SIN must be provided to the Grad Office once you receive it.
- iii. **Study permits and SIN’s have expiry dates and absolutely must be at all times valid and, when necessary, renewed for students to remain at UBC.** Allow at least three months for processing of a study permit renewal.

### 2.4.2 Taxes

Graduate research assistants (GRA) and graduate teaching assistants (GTA), as well as those receiving scholarships and fellowships, are required to pay Canadian income tax, which is deducted automatically from their monthly salaries.

### 2.4.3 Direct Deposit & Payroll

Students are paid through direct deposit. Complete and submit the [payroll direct deposit form](#)

Payroll information is available at <https://finance.ubc.ca/payroll/your-pay>.

## 2.5 HEALTH INSURANCE

Good health starts with ensuring you have up-to-date health insurance. UBC requires that all students, both domestic and international, have basic and extended health insurance for the duration of their studies. Information is available at: <https://students.ubc.ca/health-wellness/health-insurance>



## 3. ACADEMIC PROGRAMS

### 3.1 GENERAL GUIDELINES FOR COMPLETING A GRADUATE DEGREE IN CHBE

Summarized in this section is information regarding course requirements, supervisory committees and examination procedures for the research-thesis based graduate degree programs, PhD, MASc, and MSc, offered by the department, as well for our professional course-based Master's M.Eng. degree program. All Department graduate programs follow the guidelines specified by the [Faculty of Graduate and Postdoctoral Studies \(G+PS\)](#) provided in the [UBC Calendar](#).

#### *3.1.1 Student and Supervisor Agreement*

Students completing original research as a requirement for their degree (PhD, MASc and MSc) **must first review and complete the CHBE Graduate Student/Supervisor Expectation Agreement with their supervisor**, and then submit their completed Agreement to the CHBE Grad Office within the first month of their studies. The CHBE Graduate Student/Supervisor Expectation Agreement Form can be found and downloaded as a PDF file on the CHBE Departmental website.

All students completing a graduate degree requiring a thesis describing original research are expected to complete all coursework related to their degree in the first full academic year of their studies. Enrollment for credit in any courses not required for your degree is not permitted without written permission from your thesis supervisor.

In the terms for each academic year, **the final dates for either adding or dropping a course are provided in the UBC calendar and are binding.**



### 3.1. 2 Program Course Credit Requirements

The following Credit Requirement Table is program specific and valid for all graduate students, independent of starting date

| Degree Category  | Course Credits Required |     |                                |       |
|--|-------------------------|-----|--------------------------------|-------|
|  | MEng, MAsC, MSc         | PhD | Additional Course Requirements | Total |
| MEng   |                         |     |                                |       |
| MEng with UG degree in Engineering or Sciences                                 | See Section 3.5         |     | See Section 3.5                |       |
| MAsC or MSc <sup>i</sup>   |                         |     |                                |       |
| MAsC, MSc with UG degree in Engineering or Sciences                            | 18                      |     | Per Supervisory Committee      | 18    |
| PhD <sup>ii, iii</sup>   |                         |     |                                |       |
| PhD directly transferring from MAsC, MSc without completion of MAsC or MSc     | 14 → 4                  |     | Per Supervisory Committee      | 18    |
| PhD with MAsC, MSc or MEng   |                         | 9   | Per Supervisory Committee      | 9     |
| PRBA <sup>iv</sup> - Direct admission to PhD program with a BAsC or BSc degree |                         | 18  | Per Supervisory Committee      | 18    |

- i. MAsC and MSc students are required to complete at least 18 credits of coursework, including at least five 3-credit courses (two of which must be CHBE fundamental graduate courses), CHBE 597 (a 2-credit thesis-preparation course), and CHBE 598 (a Departmental seminar that students must enroll in each year they are actively pursuing their degree, for which they receive 1 course credit in the term they present in the course). MAsC and MSc may select 300 and/or 400 level undergraduate courses (up to 6 credits) relevant to their program with the approval of their supervisor and a departmental graduate advisor
- ii. MAsC or MSc students meeting specific performance requirements are eligible to transfer directly into the PhD program after partial completion of their Master's degree pending approval of their supervisor or the department. To be eligible for transfer into the PhD program, an MAsC or MSc student in our program must, during the first two years of study at the graduate level, complete a minimum of 14 credits of coursework with a first-class average. That coursework must include completion of CHBE 597 (a 2-credit thesis-preparation course) and at least 9 credits of the remaining 12 credits of coursework required for transfer must be at the 500-level or above. Once transferred into the PhD program, students must complete CHBE 598 and also complete a total of at least five 3-credit courses, including those courses completed prior to transfer. Students who have completed CHBE 597 are not required to complete CHBE 697.
- iii. PhD students holding a MAsC, MSc or M.Eng. degree are must take at least two 3-credit courses (at least two CHBE fundamental courses if such courses were not completed at the Masters level) plus CHBE 697, a 2-credit thesis preparation, and CHBE 598, a 1-credit seminar. PhD students are also required to enroll in CHBE 699 (PhD Thesis Research) each year until the defense of their thesis has been successfully completed.
- iv. In exceptional cases, applicants who hold a bachelor's degree with an overall average representing first-class standing and who demonstrate advanced research ability may be granted direct admission into our doctoral degree program on approval of the Dean of the Faculty of Graduate and Postdoctoral Studies.



*Students entering directly from a bachelor's degree must, during the first two years of study, complete a total of 12 credits with a first-class average, of which at least 9 credits must be at the 500-level or above and at least 9 credits must be of first class standing, to maintain registration as a doctoral student.*

### 3.1.2.1 CHBE Fundamental Graduate Courses

|           |   |
|-----------|---|
| CHBE 505* | Introduction to Chemical Engineering for Non-Chemical Engineers |
| CHBE 550  | Advanced Reactor Design   |
| CHBE 551  | Engineering Thermodynamics and Statistical Mechanics            |
| CHBE 553  | Mathematical Operations in Chemical Engineering                 |
| CHBE 554  | Momentum, Heat and Mass Transfer                                |
| CHBE 557  | Fluid Mechanics (MECH 502 or equivalent)                        |
| CHBE 560  | Biological Engineering  |
| CHBE 565  | Advanced Process Control  |

\* Only students without a Chemical Engineering background may take this course for credit. Approval to register for course must be recommended through your supervisor.

- CHBE Fundamental Graduate Course offerings and availability may vary from year to year.
- MASc / MSc students must take a minimum of two fundamental courses.
- M.Eng. students must take a minimum of four fundamental courses.

### 3.1.2.2 Selection of Additional Courses to Meet Program Credit Requirements

Selection of all remaining courses in fulfillment of graduate degree requirements should be made in consultation with your designated supervisor(s) and, if not in clear adherence with course requirements for the given program, with approval from the Graduate Advisor(s).

As detailed in section 3.1.2, graduate students in the MASc, MSc and PhD programs must also complete the following course requirements in pursuit of their degrees:

- i. The **Thesis Proposal Development course** (CHBE 597 or 697) must be completed in your first full academic year in the program
- ii. The **Departmental Seminar Course** (CHBE 598) must be taken every term until program completion. To fulfill the requirements of CHBE 598, students must present one seminar in the course related to their thesis topic(s), for which they will receive 1 course credit toward their degree. Students are expected to attend the seminar every Friday.
- iii. The **Thesis Research Course** (CHBE 599 or 699) must be taken every term until program completion

### 3.1.3 Research Proposal



Preparation and submission of a **Research Proposal** is required of all MASc, MSc and PhD students.

MASc and MSc candidates are expected to complete and submit a **Research Proposal** for review by their supervisory committee within 12 months from the date of initial registration in the program.

For PhD students, completion of the Comprehensive Examination, of which an oral defense on the Research Proposal is a component, is required for advancement to candidacy. PhD students are expected to complete their comprehensive examination within **15 months** from the date of initial registration in the program.

As per UBC guidelines, a PhD student who is not admitted to candidacy within 36 months from date of initial registration must withdraw from the program. Extension of this period may be permitted by the Dean of Graduate and Postdoctoral Studies in exceptional circumstances.

In all cases, the research proposal should be finalized following the completion of the CHBE 597/697 course. The Research Proposal must include a thorough literature survey in the field selected for study. In our department, the main body of the Research Proposal is expected to provide the content and adhere to the format described below:

#### *Main body*

(Not to exceed 15 pages excluding the cover page, contents list, tables, figures and reference list)

- i. Appendix (containing other peripheral material) not exceeding 15 pages.
- ii. Frame the problem and articulate the original research questions or hypotheses to be addressed
- iii. Provide a literature review that includes a critical evaluation of previous work, and a clear delineation between what is known and unknown
- iv. Describe the method(s), including theoretical developments and experiments, that will be used to investigate the problem (e.g., description of the experimental apparatus, development of the underlying theory, etc.). A limited set of preliminary results that support the validity of the proposed approach may be included.
- v. Justify the goals of the proposed research in terms of their anticipated significance to knowledge or society; advances to the discipline of engineering should be emphasized.

#### *Appendix I*

A Gantt-type Chart that defines key milestones of the proposed research program and the dates at which each milestone will be initiated and completed.

#### *Appendix II*

Other material relevant to or supporting the validity of the proposed research program (not to exceed 10 pages).

It is important for both the student and the supervisor(s) to be fully aware that the Research Proposal is expected to provide a compelling argument for the proposed research program and the methods that will be employed to complete that research. It must not be a defense of research completed. Thus, research results presented in the Research Proposal should pertain to providing evidence of the feasibility of the proposed research program





### *3.1.4 Responsible Conduct of Research*

CHBE 597/697 includes a Responsible Conduct of Research Workshop. Completion of the Workshop is required for all graduate students obtaining a research-thesis based degree. Students who have completed CHBE 597 are not required to take CHBE 697 or repeat the workshop.

### *3.1.5 Thesis*

As the product of the Student's research project, a PhD, MASc or MSc thesis elaborating the purpose, methods and results of the research completed is prepared. Students must follow the Faculty of Graduate and Postdoctoral Studies (G+PS) specific instructions for-graduate thesis preparations (<https://www.grad.ubc.ca/current-students/dissertation-thesis-preparation>)

### *3.1.6 Program Progress Reporting*

See [Appendix B](#)

### *3.1.7 Program Completion*

- i. Submission deadlines for the May and November Convocations are listed in the [Academic Year](#) section of the Calendar.
- ii. Submit a Department Clearance Form before graduation

### *3.1.8 Program Extensions*

There is a **five-year** time limit for the completion of a master's program and a **six-year** time limit for the completion of a doctoral program. Visit the G+PS website for detailed guidelines - <https://www.grad.ubc.ca/current-students/managing-your-program/program-extensions>



## 3.2 PHD

### 3.2.1 General Program Requirements

The Chemical & Biological Engineering Doctorate of Philosophy (PhD) program is a graduate-level study program that includes course requirements, a research investigation and the writing and defense of a thesis. Specific requirements for successful completion of the PhD degree include:

- i. Completion of all course requirements (see Section 3.1.2 for details)
- ii. Completion of the Responsible Conduct of Research Workshop
- iii. Preparation and submission of a Research Proposal
- iv. Passage of an Oral Comprehensive Examination in which the candidate must
  - Present and defend the Research Proposal
  - Display competency of material fundamental in nature relevant to the proposed research topic
  - Demonstrate competency in the material covered in CHBE Fundamental Graduate courses
- v. Complete the proposed research
- vi. Submit and then defend a thesis at a Departmental Oral Examination and a UBC Final Oral Examination.
- vii. Complete and submit to the CHBE Grad Office an Annual Progress Report **by July 1 of each year in the program.**

### 3.2.2 Academic Standing

PhD students must achieve a minimum mark of 68% (B-) in each course taken for credit toward their degree. Any elective courses taken outside of PhD degree will also be counted towards academic standing. For policies and procedures, see [Academic Progress](#).

### 3.2.3 PhD Supervisory Committee

A Supervisory Committee (minimum three faculty members) is required for all PhD students and:

- i. must be established by the supervisor(s) within **6 months** of the student's arrival and its membership should immediately be communicated to the CHBE Grad Office.
- ii. must consist of the student's supervisor(s) plus at least two other members:
  - one Chemical and Biological Engineering faculty



- one faculty member with suitable expertise from a different UBC unit, or external to UBC with approval from G+PS.
- iii. is to assist the student in developing an appropriate program of study, to provide advice on matters relating to the thesis research, to review periodically the progress of the thesis and to take part in the student's comprehensive research proposal and thesis examinations.
- iv. must meet with the student at **6- to at most 12-month** intervals at the request of the student or supervisor(s). Committee meeting dates are entered in the Annual Progress Report by the student and are approved by the supervisor(s) prior to submission of the completed Progress Report on an annual basis.

### 3.2.4 Examinations

All PhD students must successfully complete the following three exams throughout their studies at UBC to be able to obtain the degree.

#### 3.2.4.1 Comprehensive Examination

Chemical & Biological Engineering PhD students are required to present in writing, and to defend orally, a research proposal to fulfill the Comprehensive Examination requirement. The research proposal and oral examination are to demonstrate to an examining committee that the student has the basic engineering knowledge and overall ability to pursue the proposed research plan.

- i. Scheduling:
  - The Comprehensive Examination is expected to be scheduled within **15 months and passed within 24 months of the student's admission date**. Students may be requested by G+PS to withdraw if they have not achieved candidacy within 36 months of admission.
  - The student's supervisor forwards a request to the CHBE Graduate Advisor to appoint a **Comprehensive Examination Chair**. The CHBE Graduate Advisor appoints the Examination Chair. The appointed Chair, Supervisor(s), examination committee members (must include one CHBE faculty member and one faculty member with appropriate expertise from outside the department; both are typically selected from the student's supervisory committee) and student agree upon the exam date.
  - It is the responsibility of the Student to:
    - Distribute the Research Proposal to all members of the examining committee and to any other faculty members who request a copy, at least 10 calendar days prior to the date of the examination.
    - At least three weeks in advance, the student must [book a room](#) (CHBE 202 or CHBE 204 is recommended) for 3 hours.
    - At least two weeks in advance of the exam, the student must provide the following details to the CHBE Grad Office ([chbe.gradoffice@ubc.ca](mailto:chbe.gradoffice@ubc.ca)). The Office will then circulate an announcement of the exam.
      - Research Proposal title
      - Date, Time, Location of the Comprehensive Examination



- Names of supervisor(s) and Comprehensive Examination Committee members

ii. Comprehensive Exam

- The Comprehensive Examination cannot be held without all members of the examination committee present (supervisor(s), appointed Chair, and required members of the supervisory committee).
- The examination is normally open to any interested person. It will consist of:
  - A brief (no more than 20 minutes) oral presentation by the student detailing courses taken and marks received, as well as an overview of the **proposed** research program.
  - Questions from the examination committee and, at the discretion of the Chair, from other members of the audience who may wish to take part:
    - 1<sup>st</sup> Round Questions - assess the breadth and depth of the student's fundamental knowledge in the area of specialization and the adequacy of the student's preparation to pursue that area of research. The specific topics examined maybe defined by the Fundamental CHBE courses taken by the student.
    - 2<sup>nd</sup> Round Questions - examination of the proposed research program that the student intends to develop into a PhD research thesis
- Evaluation - The Examination Committee evaluates the student's performance in camera and renders one of the following binding decisions:

| Status           | Outcome   |
|------------------|---|
| Pass             | Proceed with proposed thesis work   |
| Conditional Pass | Committee specifies requirements to address weakness in student's background (i.e. remedial courses, supplemental literature reviews, etc.) in addition to proceeding with proposed thesis work.<br><br>Supervisor(s) is responsible for monitoring the student's progress and for ensuring the additional requirements are satisfactorily completed.   |
| Re-Examination   | Student requested to appear for re-examination at a date to be set by the examination committee.<br><br>The student may be required to improve or modify all or parts of their proposal for presentation at the re-examination, and/or may be required to study areas of basic science and/or engineering underlying the proposal (where knowledge in such areas is deemed to be inadequate) and to demonstrate proficiency at the re-examination.<br><br>Only one re-examination is permitted. |



|      |   |
|------|---|
| Fail | Student requested to withdraw from the program. |
|------|---|

- The Examining Chair completes the Report on Comprehensive Exam and forwards it to the CHBE Graduate Office.
- If the Comprehensive Exam has been passed, the PhD student and their supervisor should complete and submit an Advancement to Candidacy Form to the Grad Office. The Grad Office will forward the candidacy form to G+PS and the student will be formally admitted to Candidacy. Successful completion of the Comprehensive Examination may be stipulated for students entering the PhD program with provisional status.

#### 3.2.4.2 Departmental PhD Thesis Examination

At the end product of the PhD Candidate's research project, a PhD thesis elaborating the purpose, methods and results of this research is prepared. The thesis is defended in a Departmental Oral Examination prior to submission of a departmentally approved thesis to G+PS and subsequent scheduling of the final University PhD Oral Examination.

##### i. Scheduling

- The Candidate's Supervisory Committee will be the Departmental Oral Examination Committee.
- A Chair is not necessary for this examination, and the candidate's primary supervisor will serve as chair of the examination committee.
- It is the responsibility of the Candidate to [book a suitable room](#) for 3 hours in which to hold the examination, and to distribute their thesis to the examination committee members **at least 10 days prior to the proposed examination**
- The Candidate **must** report and confirm all details of the examination (Date & Time of examination, Thesis title, committee members, and location) to the CHBE Graduate Office **at least 2 weeks prior to the examination**

##### ii. Departmental Exam

- The examination must adhere to the following schedule:
  - A brief introduction by the chair to introduce the candidate and the examination committee to the audience, and then remind all to turn off electronic devices that might otherwise disrupt the exam
  - Up to a 25-minute presentation by the Candidate summarizing the purpose, impact and key results of the thesis research
  - A round of 20-minutes of questions from each of the examiners, followed by a limited number of questions from any in the audience who wish to participate
  - A second short round of questions from members of the examining committee to address any remaining concerns



- Evaluation – The candidate and all members of the audience are asked to leave the room to permit the examining committee to assess the quality of the thesis and the candidate's performance in the examination. The committee then decides on one of the following possible binding outcomes of the Departmental Oral Examination and informs the candidate of their decision:

| Status                              | Outcome   |
|-------------------------------------|---|
| Pass                                | Minor thesis changes required; typographical and grammatical errors and minor editorial. Revision to be overseen by the Candidate's supervisor(s).  |
| Pass – substantive changes required | Substantive thesis changes required. Changes must be reviewed by the Candidate's supervisor(s) and may require approval of one or more of the other members of the examination (supervisory) committee.   |
| Re-Examination                      | Candidate is requested to appear for re-examination at a date to be set by the examination (supervisory) committee. The reasons may include the requirement of major revisions to the thesis or the need for the Candidate to be more adequately prepared or the examination. Only one re-examination is permitted. |
| Fail                                | Candidate is requested to withdraw from the program   |

- Immediately after the Departmental Oral Examination (successful or otherwise), the supervisor(s) submits a completed Oral Examination form to the CHBE Grad Office.
- On successful departmental defense of the thesis (including all required thesis revisions), the Candidate must immediately review and follow the [Doctoral Examinations Planning Tool and Checklist for Candidates and Supervisors](#) in preparation for their University PhD Oral Examination. As part of that process an external examiners nomination form prepared by the student's supervisor must be submitted to the Grad Office at least 8 weeks before the proposed University PhD Oral Examination date.
- There is a minimum of 6-7 weeks required between the submission of the departmentally approved thesis to the G+PS and the final University PhD Oral Examination.



#### 3.2.4.3 Final Oral Examination

The last requirement towards obtaining a doctoral degree is the final University PhD Oral Examination, a public defense of the Candidate's thesis. The University PhD Oral Examination is an inherently complex process to navigate and G+PS provides guidance to reduce stress for all involved. Instructions can be found at <https://www.grad.ubc.ca/current-students/final-doctoral-exam/final-doctoral-examination-guide>

The candidate should consult with G+PS to ensure all submission requirements are fulfilled (<http://www.grad.ubc.ca/current-students/final-dissertation-thesis-submission>).

When the Dean of Graduate and Postdoctoral Studies has been informed that the thesis has been accepted by the Library, he/she will, on approval by the Faculty, recommend to the UBC Senate that the Candidate be awarded the degree of PhD in Chemical and Biological Engineering.



### 3.3 MASC

#### 3.3.1 General Program Requirements

The Chemical & Biological Engineering Master's of Applied Science (MASC) program is a graduate-level study program that includes course requirements, a research investigation and the writing and defense of a thesis. Specific requirements for successful completion of the MASc degree include:

- i. Completion of all course requirements (see Section 3.1.2 for details)
- ii. Completion of the Responsible Conduct of Research Workshop
- iii. Writing of a Research Proposal and submission to supervisory committee
- iv. Execute the proposed research
- v. Write and defend a thesis at a Departmental MASc Thesis Examination
- vi. Complete and submit to the CHBE Grad Office an Annual Progress Report **by July 1 of each year in the program**

#### 3.3.2 Academic Standing

MASc students must achieve a minimum of 60% in any course taken for credit in order to be granted Pass Standing. However, only 6 credits of Pass Standing may be counted towards a Master's program; for all other courses credited to the program, a final course mark of at least 68% must be obtained. All courses including those outside of degree requirements will also be counted towards academic standing. For policies and procedures, see [Academic Progress](#).

#### 3.3.3 MASc Supervisory Committee

A Supervisory Committee (minimum three faculty members) is required for all MASc students and:

- i. must be established by the supervisor(s) within 12 months after the student registers and its membership should then communicated immediately to the CHBE Grad Office.
- ii. includes student's supervisor(s). If the supervisor is absent from campus for more than a month, the supervisor must appoint an acting supervisor.
- iii. must include a minimum of two additional members;
  - one must be a CHBE faculty member
  - one may be a faculty member from outside the Department or a non-faculty member approved by the MASc Graduate Advisor.
- iv. Must be presented a Research Proposal by the MASc student shortly after it is established.
- v. is to assist the student in developing an appropriate program of study, to provide advice on matters relating to the thesis, to review the progress of the thesis on a periodic basis, and to take part in the final MASc thesis examination.
- vi. should meet with the student within 12 months after their program start and, subsequently, at 6-month intervals or more frequently if requested by the student or supervisor(s).





### 3.3.4 MASc Thesis Examination

At the end product of the MASc student's research project, a thesis elaborating the purpose, methods and results of this research is prepared. The thesis must then be defended in a Departmental MASc Thesis Examination.

#### i. Scheduling

- The student's Supervisory Committee will be the Examination Committee.
- A Chair is not necessary for this examination, and the student's primary supervisor will serve as chair of the examination committee.
- It is the responsibility of the student to [book a room](#) for 2.5 hours in which to hold the examination, and to distribute their thesis to the examination committee members **at least 10 days prior to the proposed examination**
- The student **must** report and confirm all details of the examination (Date & Time of examination, Thesis title, committee members, and location) to the CHBE Graduate Office **at least 2 weeks prior to the examination**

#### ii. Exam

- The examination must adhere to the following schedule:
  - A brief introduction by the supervisor, to introduce the student and the examination committee to the audience, and then remind all present to turn off electronic devices that might otherwise disrupt the exam
  - Up to a 25-minute presentation by the student summarizing the purpose, impact and key results of the thesis research
  - A round of 20-minutes of questions from each of the examiners, followed by a limited number of questions from any in the audience who wish to participate
  - A second short round of questions from members of the examining committee to address any remaining concerns
- Evaluation – The student and all members of the audience are asked to leave the room to permit the examining committee to assess the quality of the thesis and the candidate's performance in the examination. The committee then decides on one of the following possible binding outcomes of the MASc Thesis Examination and informs the student of their decision:



| Status                              | Outcome   |
|-------------------------------------|---|
| Pass                                | Minor thesis changes required; typographical and grammatical errors and minor editorial. Revision to be overseen by the student's supervisor(s).  |
| Pass – substantive changes required | Substantive thesis changes required. Changes must be reviewed by the student's supervisor(s) and may require approval of one or more of the other members of the examination committee.   |
| Re-Examination                      | Student is requested to appear for re-examination at a date to be set by the examination committee. The reasons may include the requirement of major revisions to the thesis or the need for the student to be more adequately prepared for the examination.<br>Only one re-examination is permitted. |
| Fail                                | Student is requested to withdraw from the program   |

- If the thesis is satisfactory, the Examination Committee will determine the mark for the MASc thesis (i.e., for CHBE 599) according to the following weighting scheme:
  - If the number of supervisors is less than the number of non-supervisors, 50% of the total mark is allocated to the student's supervisors and 50% to the other examining committee members.
  - If the number of supervisors is greater than or equal to the number of non-supervisors, 60% of the total mark is allocated to the student's supervisors and 40% to the other examining committee members.
  - In general, the mark of each supervisor is weighted equally, as is the mark of each non-supervisor.
- Immediately after the MASc Thesis Examination has been successfully completed, the Examination Chair submits a completed Master's Thesis Examination Report form, including the student's mark (out of 100%), to the CHBE Grad Office. The CHBE Grad Office will submit the mark.
- After the thesis has been revised (if needed) and approved by the supervisor(s), the MASc student electronically submits it to the G+PS (<http://www.grad.ubc.ca/current-students/final-dissertation-thesis-submission>) and to the Chemical & Biological Engineering CHBE Grad Office.
- When the Dean of Graduate Studies has been informed that the thesis has been accepted by the Library, he/she will, on approval by the Faculty, recommend to the UBC Senate that the student be awarded the degree of MASc in Chemical and Biological Engineering.



## 3.4 MSc

### 3.4.1 General Program Requirements

The MSc program is a graduate-level study program in Chemical and Biological Engineering for students who received their undergraduate degree in a discipline other than engineering. It includes a research investigation and the writing of a thesis.

Specific requirements for successful completion of the MSc degree include:

- i. Completion of all course requirements (see Section 3.1.2 for details)
- ii. Completion of the Responsible Conduct of Research Workshop
- iii. Writing of a Research Proposal and submission to supervisory committee
- iv. Execute the proposed research
- v. Write and defend a thesis at a Departmental MSc Thesis Examination
- vi. Complete and submit to the CHBE Grad Office an Annual Progress Report **by July 1 of each year in the program**

### 3.4.2 Academic Standing

MSc students must achieve a mark of 60% in any course taken for credit in order to be granted Pass Standing. However, only 6 credits of Pass Standing may be counted towards a Master's program; for all other courses credited to the program, a final course mark of at least 68% must be obtained. All courses taken including those outside of degree requirements will also be counted towards academic standing. For policies and procedures, see [Academic Progress](#).

### 3.4.3 Thesis Committee & Thesis Examination

The requirements for the thesis committee and the thesis examination for MSc students are identical to those specified in Sections 3.3.3 and 3.3.4 for MASc students.



## 3.5 MEng

### 3.5.1 Program and Course Requirements

The MEng degree in Chemical and Biological Engineering is a course-based degree and is intended primarily for students who have work experience in addition to a bachelor's degree in Chemical and Biological Engineering. The degree requires 30 credits of advanced course work (Co-op credits do not count towards degree credit requirements).

The breakdown of course requirements is as follows:

| Course Description   | Credits    |
|--|------------|
| 500 level CHBE Fundamental Courses   | 12 credits |
| 500 level CHBE Courses <sup>i</sup> OR completion of MEng Report course (CHBE 596) | 6 credits  |
| 500 level credit CHBE* or non-CHBE (Engineering or Science) courses                | 12 credits |
| Total  | 30 credits |

- CHBE courses may include IWME, GBPR and CEEN courses (with the exception of CEEN 501) as space permits.
- Entering students with Bachelor's degrees from other engineering or science programs, and provisional students may be required to take additional undergraduate courses to improve their background knowledge in the case of the former, or to qualify for full standing, in the case of the latter. These additional courses are selected by the MEng Advisor and will not normally be credited as part of the student's MEng program courses.

\*A maximum of 6 credits of 300 or 400 level courses may be substituted.

MEng students must also complete and submit an Annual Progress Report, due every July.

### 3.5.2 Optional MEng Report (6 Credits)

#### 3.5.2.1 Requirements

Students are required to find their own MEng Report Advisor. It is recommended to complete the report within one (1) term. The advisor must be a CHBE faculty member.

#### 3.5.2.2 Procedures:

- Student enrolls in CHBE 596 – MEng Report course
- Student reviews the areas of research of individual professors in the department and approaches potential project advisors for consultation about the MEng report.
- When mutual agreement has been reached between the student and the potential report advisor, the report advisor sends a memo to the CHBE MEng Advisor for approval and to the CHBE Grad Office for record keeping.
- The report advisor will assist the student in the selection of a suitable topic and/or courses and will provide guidance of the project work and report writing.



### 3.5.2.3 Report & Examination

#### Phase I: Report Preparation and Submission

- i. The MEng report is an essay of at least 3000 words on a technical topic selected by the student in consultation with the MEng report advisor.
- ii. MEng Reports are typically based on reasonably comprehensive literature searches, engineering design calculations/computations, and/or short experimental/theoretical projects arising out of work in the advisor's lab, etc.

#### Phase II: Examination

- i. An examination of the Student and their submitted MEng Report will take place in fulfillment of course requirements (CHBE 596). Preparation and holding of the examination should adhere to the following procedure:
  - The Report Advisor and student must select and confirm a second examination committee member
  - The student must book an examination room (CHBE 202 or CHBE 204 is recommended) for 3 hours **at least three weeks** prior to the exam.
  - The student must provide the following information to the Graduate office ([chbe.gradoffice@ubc.ca](mailto:chbe.gradoffice@ubc.ca)) **at least two weeks** prior to the exam:
    - Report title
    - Date, Time, Location
    - Names of MEng report advisor and the second examination committee member
  - The CHBE Grad Office will circulate an announcement of the exam.
  - The examination is normally chaired by the student's report advisor.
- ii. Format
  - Oral presentation: Student provides a 20-minute summary of the Report
  - Questions (~ 30 minutes) from each examiner. Questions may be on any subject related directly or indirectly to the contents of the Report.
- ii. Evaluation: The examiners evaluates the student's performance *in camera* and reports their binding decision to the student.



Examination Outcomes may include:

| Status                              | Outcome  |
|-------------------------------------|--|
| Pass                                | Minor Report changes required; typographical and grammatical errors and minor editorial. Revision to be reviewed by the MEng report advisor  |
| Pass – substantive changes required | Substantive Report changes required. Changes must be approved by student's report advisor and the other examiner.  |
| Re-Examination                      | Student is requested to appear for re-examination at a later date. The conditions for re-examination may include significant revisions of the Report and/or better preparation by the student. Only one re-examination is permitted. |
| Fail                                | Student is requested to withdraw from the MEng program   |

- After the exam, the student's MEng report advisor must provide a completed MEng Examination Report to the Graduate office.
- On successful completion of the Engineering Report Examination, and following completion of all requested additions and edits to that document, the student must submit a copy of the revised report to the CHBE Grad Office.
- When the student has met all of the other requirements of the program, on the approval of the Faculty of Applied Science, the Dean will recommend to the UBC Senate that the student be awarded the degree of MEng in Chemical and Biological Engineering.

### 3.5.3 Academic Standing

All Master of Engineering students are required to meet the [minimum academic standing](#) in the program. Students must achieve a mark of 60% in any course taken for credit in order to be granted Pass Standing. However, only 6 credits of courses in the C to C+ range (60-67%) may be counted towards an MEng degree. For all other courses, a minimum of 68% must be obtained. Any elective courses taken outside of degree will also be counted towards academic standing.

If the student fails to meet the minimum academic standing, they will be required to proceed with an unsatisfactory academic progress evaluation with the MEng advisor and CHBE grad office. This may lead to withdrawal from the program.



### 3.5.4 Projected Course Curriculum

**Note:** The tables provided below are recommended schedules that an MEng student could follow, but each student has the flexibility to customize their own schedule. **Students are to submit their proposed schedule in November of their first academic year to the CHBE Grad Office.**

#### Recommended Schedule I: Without Co-op\* Component

Completion in 3 or more terms

| Term 1<br>September                          | Term 2<br>January                            | Term 3<br>May or September                                    |
|--|--|---|
| 12 credits <sup>1</sup> of 500-level courses | 12 credits <sup>1</sup> of 500-level courses | 6 credits of 500-level courses<br>OR 6 credits of MEng Report |

#### Recommended Schedule II: With Co-op\* Component

Extended completion

| Term 1<br>September                          | Term 2<br>January                            | Term 3<br>May         | Term 4<br>September   |
|--|--|-----------------------|---|
| 12 credits <sup>1</sup> of 500-level courses | 12 credits <sup>1</sup> of 500-level courses | 4-month of Co-op Term | 6 credits of 500-level courses<br>OR 6 credits of MEng Report |

\*Co-op positions are not guaranteed. Visit [co-op website](#) for more information. Students who are away for a co-op term must return for a full academic study term to complete their MEng program.

<sup>1</sup> Students can take up to 6 credits of 300/400-level courses (Engineering or Science)

**Note:** These two examples are for students who want to complete the program within 12-16 months. For those who plan to finish the program within 18-24 months, students can take fewer courses during the first two terms.



## 3.6 REGULATIONS

### 3.6.1 G+PS

Research Students should consult the [G+PS website](#) and [University Calendar](#) for policies and regulations.

### 3.6.2 CHBE Annual Progress Reports

Graduate Student Annual Progress Report: All PhD, MASc, MSc and MEng students are required to submit an annual progress report in July of each academic year. The annual report records student progress to ensure that program completion is within normal time lines. Students who are behind schedule must meet with their graduate advisors and produce a timeline for completion.

### 3.6.3 Grading and Academic Progress

Students who have achieved an F standing in any course, whether related to degree or not, must notify their supervisor, and the graduate office immediately. The student will meet with their respective graduate advisor to be given a recommendation for their next steps. For grading practices by program, see our [Academic Calendar](#).





## 4. AWARDS & FUNDING

The Department of Chemical and Biological Engineering at the University of British Columbia provides graduate students financial support and awards including scholarships.

### 4.1 FINANCIAL AID

#### 4.1.1 Graduate Research Assistantships (GRAs)

For graduate students in the MASc, MSc and PhD programs without scholarships or external funding, minimum stipends for nominal periods are provided by the students' supervisor(s), subject to satisfactory annual performance, progress and availability of research funds. Beyond the nominal timeframe, student stipends are determined by the supervisor(s) and on the availability of funds.

| Program   | Nominal Time From Program Start | Minimum Stipend |
|-----------|---------------------------------|-----------------|
| MASc, MSc | 2 years                         | \$22,000/year   |
| PhD       | 4 years                         | \$25,000/year   |

#### 4.1.2 Graduate Teaching Assistantships (GTAs)

Graduate students in our MASc, MSc and PhD programs may apply for Teaching Assistantships with the agreement of their supervisor(s). TA position remuneration typically ranges from \$1,000 to \$3,600 per year.

#### 4.1.3 Additional Payments (GAAs)

Supervisors may pay students for additional work performed that is not related to their individual graduate study project.



## 4.2 AWARDS

### 4.2.1 Internal (Department) Awards & Scholarships

The Chemical and Biological Engineering Department awards deserving students with a prestigious 4-Year Doctoral Fellowship (4YF) and GSI award. These two awards are specific to incoming students, and students are automatically considered for these opportunities. No additional application is required.

| Scholarship                       | Amount  | Comments  |
|-----------------------------------|---|---|
| 4-Year Doctoral Fellowship (4YF)  | \$18,200 per year plus full tuition for maximum 4 years | Incoming PhD students are considered once during the first 12 months of their PhD program<br><br>MAsc to PhD transfer students are considered within the first year following their transfer.<br><br>Supervisors provide top-up of \$8,000 each year. |
| Graduate Student Initiative (GSI) | Up to \$5,000 (One-time)                                | Incoming MAsc, MSc, PhD students with an overall first class standing in their most recent four academic years are considered. Awards are subject to availability of funds.   |

### 4.2.2 External Awards & Scholarships

#### NSERC, Killam and Vanier Scholarships

Competitive External Scholarship details and eligibility can be found through the following links:

[http://www.nserc-crsng.gc.ca/Students-Etudiants/PG-CS/index\\_eng.asp](http://www.nserc-crsng.gc.ca/Students-Etudiants/PG-CS/index_eng.asp)

<https://www.grad.ubc.ca/awards/vanier-scholarship>

<https://www.grad.ubc.ca/awards/canada-graduate-scholarships-doctoral-cgs-d-program>



| Scholarship                                | Award                                       | Top-Ups  |
|--|---|--|
| CGS M (for Masters)                        | \$17,500 for 12 months<br>(non-renewable)   | Minimum \$8,000 by supervisor for every year of the scholarship term   |
| PGS D (for PhDs)                           | \$21,000 a year<br>(for two or three years) | Minimum \$7,342 by supervisor for every year during the term of the scholarship.   |
| CGS D (for PhDs)                           | \$35,000 a year<br>(for two or three years) | Minimum \$3,797 by supervisor for every year during the term of the scholarship  |
| Killam Doctoral Scholarships<br>(for PhDs) | \$30,000 a year<br>(For two years)          | Includes a \$2000 allowance for research-related travel during the 24 months of the scholarship, and tuition coverage. Minimum \$5,062 by supervisor for every year during the term of the scholarship |
| Vanier (for PhD's)                         | \$50,000 per year<br>(for three years)      | No minimum   |



## 5. FACILITIES AND SERVICES

The Department of Chemical and Biological Engineering offers a number of facilities and services to assist graduate students with their courses and research.

All contact information, and departmental roles can be found on our website:

<https://www.chbe.ubc.ca/our-people/staff/>

### 5.2 RESOURCES

CHBE Meeting rooms, Workshop and Stores information is at: [www.chbe.ubc.ca](http://www.chbe.ubc.ca)





## 6. SAFETY

### 6.1 HEALTH, SAFETY AND ENVIRONMENT

***CHBE strives to maintain a safe, healthy and secure working environment for work and study. Safety is EVERYONE'S responsibility***

Teaching and research activities in the Department are guided by regulatory requirements and by UBC policies. As outlined in UBC Policy #7, University Safety (PDF), all Department faculty, staff and students have a role to play in maintaining a healthy, safe and environmentally sustainable university. The responsibilities include developing, implementing and maintaining all elements of the safety program in their work activities.

Graduate students are encouraged to serve on the CHBE Local Safety Team (LST) which oversees and promotes safety awareness, policies and practices in the Department.

The departmental website contains information related to Health, Safety and Environment (HSE) at CHBE (<http://www.chbe.ubc.ca/safety/index.php>). ***New graduate students must attend a department safety orientation*** and UBC risk Management Safety courses related to their lab and research work. Graduate students are expected to think and act safely:

**Experimental Research.** Follow regulations for the operation of experimental equipment and for the handling and disposal of all materials associated with their research projects.

- ***New experimental equipment must be inspected and approved by the LST prior to operations.*** Students are encouraged to discuss safe design and operation before fabrication with their supervisor(s) and the department workshop staff. Equipment is to be used only for the purposes that it was designed for.
- Students are responsible for ensuring that chemicals are properly managed including appropriate labelling, flammable liquids storage in appropriate cabinets, noxious or odorous chemicals handled in a fume hood, all wastes disposal of in an acceptable manner and areas around the apparatus and in labs are maintained in a clean and tidy condition.
- Students must obtain **supervisor approval to work alone in the laboratory and must complete a Work Alone form.**
- Laboratory equipment must be attended when in operation. In case this is not always possible, emergency shutdown procedures plus the student's and supervisors' phone numbers must be conspicuously posted near the equipment

Students are urged to participate in Department safety by becoming Lab Safety Reps or joining the Safety Committee. Safety concerns can emailed to [safety@chbe.ubc.ca](mailto:safety@chbe.ubc.ca)



## 6.2 CHEMICAL HANDLING, STORAGE, AND DISPOSAL

All chemicals used in the building must be properly identified and accompanied by a copy of the MSDS (Materials Safety Data Sheet) which specifies safe handling and disposition procedures.

## 6.3 WASTE CHEMICALS

The Department works within the regulatory agencies and UBC policies and procedures to responsibly manage hazardous good and waste. See the CHBE Website for information regarding waste handling procedures.

## 6.4 BUILDING ISSUES

For building services issues, (e.g., heating, lighting, ventilation, electric power, steam, compressed air, etc.), email [building@chbe.ubc.ca](mailto:building@chbe.ubc.ca) or contact 604.822.3857



## 7. HEALTH & WELLBEING

### 7.1 EMERGENCY CONTACTS

#### 7.1.1 First Aid

- 778-918-6970 (OFA2, Mondays – Fridays, 8:30am – 4:30pm)
- 604-822-4444 (Campus First Aid)
- 604-822-7662 (UBC Hospital Urgent Care, 8:00am – 10:00pm)
- Contact a Department First Attendant

#### 7.1.2 Emergency

- Call 911
- **Any injuries which occur within the building are to be reported immediately to Marlene Chow (marlene.chow@ubc.ca).**

What information is required when I dial 911?

- Describe the emergency
- Location
- Building Name
- Building Address & Room Number
- Phone Number
- Do **not** hang up, as additional information may be needed

#### 7.1.3 Additional Emergency Resources

A full list of numbers and addresses for services on campus available to students, faculty and staff can be found on our [Emergency and Non-Emergency Numbers page](#).

### 7.2 STUDENT SUPPORT

Health and wellness are important parts of students' academic success and personal life. Please visit UBC Student Services website ([Health & wellness](#)) for more information on the resources and support available to all UBC students on and off campus.





## 8. COMMUNITY RESOURCES

### 8.1 SOCIAL OPPORTUNITIES

#### 8.1.1 CHBE Graduate Student Council

The Chemical and Biological Engineering Graduate Student Council (CHBE GSC)

<https://blogs.ubc.ca/chbegsc/>

- i. Advocates the interests of, and organizes social, recreational, and professional development events for graduate students within the Department. CHBE graduate students are encouraged to participate in activities to enhance their time with the Department.
- ii. Organizes social events; past events have included hikes, sports, foosball tournaments and an annual Christmas party. The largest Council held event has been organizing a “Research Day” conference, an opportunity for students to display their research, meet with industry professionals and to participate in student competitions.
- iii. Plays an active role in departmental affairs with representatives on various departmental committees including Department Faculty meetings to communicate graduate student concerns. The Club also sends a representative to the UBC Graduate Student Society meetings.

Contact a Council Co-President ([chbegsc.president@chbe.ubc.ca](mailto:chbegsc.president@chbe.ubc.ca)) to get involved!

#### 8.1.2 UBC Graduate Student Society

UBC's almost 9,000 graduate students are members of the UBC Graduate Student Society (GSS). Along with tuition fees, an additional fee is collected from graduate students and transferred to the GSS to fund activities. For more information, visit: <https://gss.ubc.ca/>

**The Graduate Student Centre** (#225-6371 Crescent Road, 822-3203): The Grad Centre provides social facilities to graduate students. See: <https://gss.ubc.ca/>

### 8.2 INTERNATIONAL STUDENT ADVISING

UBC International House – 1783 West Mall, Vancouver.

A hub for international students to access advising and support, and international learning opportunities, as well as a meeting place for Canadian and international students. <https://students.ubc.ca/international-student-guide>.

All inquiries regarding your status as an international student should be directed to: [isa@students.ubc.ca](mailto:isa@students.ubc.ca)

### 8.3 PROFESSIONAL ASSOCIATIONS

Engineers and Geoscientists of British Columbia

<https://www.egbc.ca/>



## APPENDIX A. LEARNING OUTCOMES

### A-1. PHD

|  | Learning Outcomes  | Indicators of Achievement   |
|--|--|---|
| <i>Expectations</i>                        | <i>Upon completion of the PhD Program, students will be able to:</i>   | <i>Examples of indicators that can reflect achieving certain learning outcomes:</i>   |
| <b>Knowledge, Research and Scholarship</b> | <ul style="list-style-type: none"> <li>a) Demonstrate mastery of knowledge in a specific, academic field, and show potential to teach that academic field at the university level.</li> <li>b) Generate independent and high-quality research that is original and contributes in a meaningful way to knowledge within a specific field.</li> <li>c) Conduct critical reviews and syntheses of current state-of-the-art and practice in the sub-discipline related to the student's areas of research.</li> <li>d) Demonstrate advanced knowledge and specialized techniques in the field (experimental, numerical modeling and/or simulation).</li> </ul> | <ul style="list-style-type: none"> <li>a) Results of experimental and theoretical investigations, theses, publications, technical presentations and patents. Commonly, the scope of research is equivalent to at least 3 peer-reviewed papers in high quality journals.</li> <li>b) Successful performance in graduate level courses taken for credit (a minimum of 68% (B-) must be achieved in all courses), including the proposal development course (CHBE 697).</li> <li>c) Successful defense of PhD thesis proposal and passing of comprehensive exam.</li> <li>d) Successful defence and completion of a PhD thesis.</li> <li>e) Mastery and ability to transfer advanced knowledge of specialized techniques to others.</li> </ul> |
| <b>Communication Skills</b>                | <ul style="list-style-type: none"> <li>a) Demonstrate logical thinking and communication skills (written, verbal) to the academic community, industry, undergraduate students and the public.</li> <li>b) Listen without interrupting others and contribute thoughtful and scholarly responses to comments.</li> </ul>   | <ul style="list-style-type: none"> <li>a) Clear and comprehensive oral presentations during proposal and thesis proposal defense, graduate courses, departmental research seminar, conferences, and thesis defenses.</li> <li>b) Coherent, conceptual, and well-referenced, written progress reports; journal publications; proposal and thesis.</li> <li>c) Articulate, precise, and thorough responses to questions while defending proposals, reports and theses.</li> </ul>   |



|  |   |   |
|--|---|---|
|  |   | <ul style="list-style-type: none"> <li>d) Participate in activities such as 3MT, Let's Talk Science, Imagine day, etc.</li> <li>e) Positive student evaluations of work as a Teaching Assistant.</li> </ul>   |
| <b>Critical Thinking and Problem Solving</b> | <ul style="list-style-type: none"> <li>a) Demonstrate critical thinking in preparing research and in the synthesis of the literature associated with the research topic.</li> <li>b) Design problem-solving techniques for economic decision-making, legal constraints, codes of practices, health and safety in the student's research project.</li> </ul> | <ul style="list-style-type: none"> <li>a) Definition of a problem for the thesis objective and well-founded plans for solving the problem.</li> <li>b) Ability to accept failure; and move quickly to adapt to new ideas.</li> <li>c) Ability to receive feedback; and reflect on performance.</li> <li>d) Successful completion of PhD comprehensive exam.</li> <li>e) Successful completion of graduate courses that include problem solving.</li> </ul>  |
| <b>Health and Safety</b>                     | <ul style="list-style-type: none"> <li>a) Establish, promote and maintain a safe work environment for the student and coworkers.</li> <li>b) Contribute to a respectful and inclusive work environment.</li> <li>c) Establish strategies for personal well-being.</li> </ul>  | <ul style="list-style-type: none"> <li>a) Successful completion of general and lab-specific safety training.</li> <li>b) Application of standards and safe work practices in research and project work.</li> <li>c) Contribution to improving safety culture.</li> <li>d) Demonstration of safe work practices for research labs and mentoring of UG students in teaching.</li> <li>e) Courteous attitude and contributions to a respectful, collegial work environment.</li> <li>f) Record of safe behaviour in progress reports.</li> <li>g) Responsibly report safety and environmental concerns.</li> <li>h) Regular safety surveys are completed in a full and timely manner.</li> <li>i) Materials for safety audits (standard operating procedures, operating manuals, HAZOPs, etc.) for research and committee are well and thoughtfully prepared and presented.</li> </ul> |



|  |   |  |
|--|---|--|
|  |   | j) Positive attitude and mindfulness.  |
| <b>Ethical Conduct &amp; Environmental Stewardship</b> | <ul style="list-style-type: none"><li>a) Conduct research in a responsible manner and apply ethical standards.</li><li>b) Critically assess any ethical and legal implications of research.</li><li>c) Contribute to the preservation of local and global environments.</li></ul> | <ul style="list-style-type: none"><li>a) Completion of accurate annual progress reports, and of a Responsible Conduct of Research workshop</li><li>b) No plagiarism</li><li>c) Demonstration of consistent, ethical conduct and scholarly rigour and integrity in proposals and research; in recording, analyzing, and interpreting data; and in reporting and publishing data and findings.</li><li>d) Documentation of research records, and of sharing records with others.</li><li>e) Environmental and ethical issues are brought to the attention of supervisors, safety committee or others as appropriate.</li><li>f) Evidence of open and full cooperation with those charged with ensuring ethical and environmental standards are met.</li><li>g) Attendance at relevant workshops and/or training offered by UBC or external bodies.</li><li>h) Appropriate waste disposal and clean-up of lab space and office after degree is completed.</li></ul> |



## A-2. MASc, MSc

|  | Learning Outcomes  | Indicators of Achievement  |
|--|--|--|
| <b>Expectations</b>                        | <i>Upon completion of the MASc or MSc Program, students will be able to:</i>   | <i>Examples of indicators that can reflect achieving certain learning outcomes:</i>  |
| <b>Knowledge, Research and Scholarship</b> | <ul style="list-style-type: none"> <li>a) Evaluate what is known in a particular academic field.</li> <li>b) Conduct research in a particular academic field.</li> <li>c) Demonstrate advanced knowledge of specialized techniques (experimental, numerical modeling and/or simulation).</li> </ul>                    | <ul style="list-style-type: none"> <li>a) Summary of results of experimental and theoretical investigations, theses, publications, technical presentations and patents. Commonly, the scope of research is equivalent to at least one peer-reviewed paper.</li> <li>b) Successful performance in graduate level courses taken for credit (a minimum of 68% (B-) must be achieved in all courses), including the proposal development course (CHBE 597).</li> <li>c) Successful defence and completion of a MASc thesis.</li> </ul>   |
| <b>Communication Skills</b>                | <ul style="list-style-type: none"> <li>a) Demonstrate logical thinking and communication skills (written, verbal) to the academic community, industry, undergraduate students and the public.</li> <li>b) Listen without interrupting others and contribute thoughtful and scholarly responses to comments.</li> </ul> | <ul style="list-style-type: none"> <li>a) Clear and comprehensive oral presentations during graduate courses, departmental research seminar, conferences, proposal and thesis defense.</li> <li>b) Clear, complete, and appropriately formatted progress reports, journal publications, proposal and thesis.</li> <li>c) Thoughtful and articulate responses to questions while defending proposals, reports and theses.</li> <li>d) Participation in activities such as 3MT, Let's Talk Science, Imagine day, etc.</li> <li>e) Positive student evaluations as a Teaching Assistant.</li> </ul> |

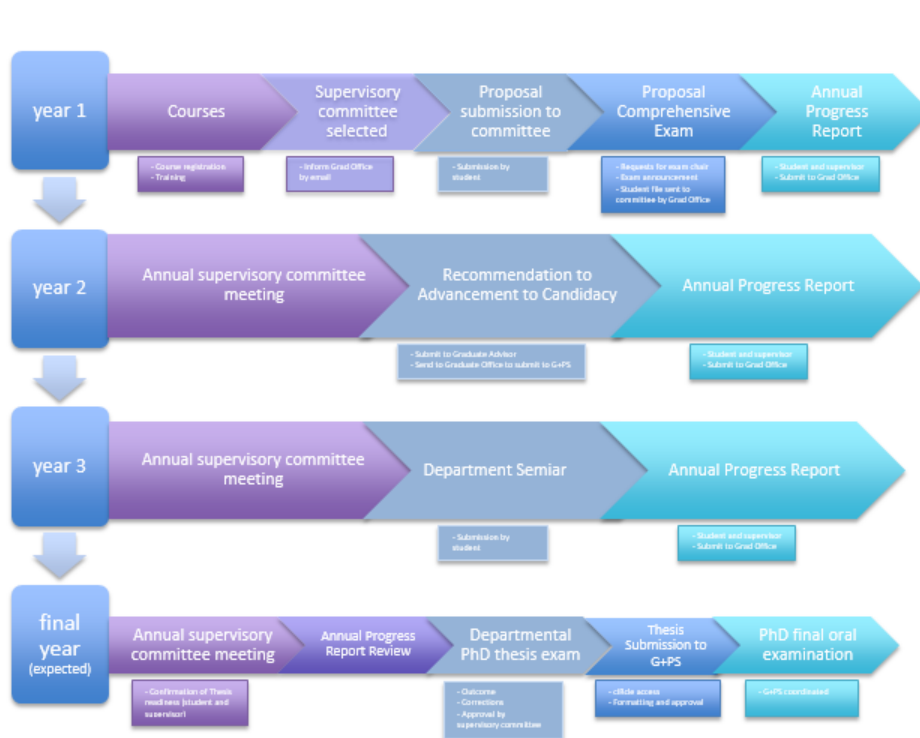


|  |   |   |
|--|---|---|
| <b>Critical Thinking and Problem Solving</b> | <ul style="list-style-type: none"><li>a) Demonstrate critical thinking about what is known in a particular academic field.</li><li>b) Use problem-solving techniques in economic decision-making and take legal constraints, codes of practices, health and safety into account during thesis work.</li></ul> | <ul style="list-style-type: none"><li>a) Designing an appropriate methodology for solving a problem</li><li>b) Situating the problem in an appropriate critical review of the literature.</li><li>c) Ability to accept failure and move quickly to adapt to new ideas.</li><li>d) Ability to receive feedback, and reflect on performance.</li><li>e) Successful completion of graduate courses</li><li>f) and thesis project that include problem solving.</li></ul> |
|--|---|---|



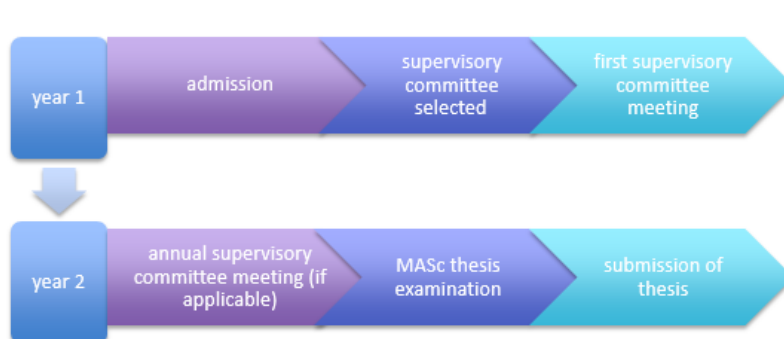
## APPENDIX B. PROGRAM PROGRESS PATHS

### B-1. PHD



| Procedural forms   | Checked by:     |
|--|-----------------|
| Student supervisor agreement   | Grad office     |
| Committee selection form   | Grad advisor    |
| Comprehensive Research Proposal arrangement (selection of chair)   | Grad office     |
| Comprehensive Research Proposal record prepared by chair and signed by all (email confirmation can suffice)  | Grad advisor    |
| Annual supervisory committee meeting record prepared by supervisor and signed by all including the student   | Grad advisor    |
| Annual progress report (prepared by student and signed by supervisor)  | Grad advisor    |
| Annual supervisory committee meeting record  | Grad advisor    |
| Annual progress report   | Grad advisor    |
| All-but-dissertation status (check for all requirements)   | Grad office     |
| Annual supervisory committee meeting record  | Grad advisor    |
| Annual progress report   | Grad advisor    |
| Departmental PhD Thesis Examination Record (signed by all)   | Grad office     |
| Selection of the university and external examiners on the External Examiner form to be done by consensus of all the supervisory committee members. | Faculty of G+PS |

### B-2. MASC, MSC



| Procedural forms   | Checked by:  |
|--|--------------|
| Student supervisor agreement   | Grad Office  |
| Committee selection form   | Grad Advisor |
| Annual supervisory committee meeting record prepared by supervisor and signed by all including the student                 | Grad Advisor |
| Annual progress report   | Grad Advisor |
| Annual supervisory committee meeting record prepared by supervisor and signed by all including the student (if applicable) | Grad Advisor |
| MASC Thesis examination record (signed by all)   | Grad Advisor |