UNIVERSITY
OF
ALBERTA

DEPARTMENT OF BIOCHEMISTRY
GRADUATE PROGRAM MANUAL – Fall 2024

4-74 Medical Sciences Building – Faculty of Medicine and Dentistry –
Edmonton, Alberta – T6G 2H7 – 780-492-7834

Contents

Section 1: How to Apply for Graduate Admission

Ensure your meet the minimum requirements

- A four-year baccalaureate degree or its equivalent from an academic institution recognized by the University of Alberta.
- A Grade Point Average (GPA) of 3.3 on a 4.0 scale. The GPA calculation will be determined from the most recent 2 years (or 60 credits) of course work.
- A B.Sc degree in Biochemistry or a closely related discipline is normally required for admission, but outstanding applicants from related disciplines are encouraged to apply.
- Please ensure you meet the **minimum requirements from other countries** as set by the Faculty of Graduate and Postdoctoral Studies (GPS) before applying https://www.ualberta.ca/graduate-studies/prospective-students/international-admissions-protocol/international-academic-requirements/index.html

Applicants with degrees and qualifications in a language other than English may need to demonstrate English Language Proficiency. Proficiency can be demonstrated by a satisfactory score on one of the following approved English language examinations (please refer to the GPS website for the most up-to-date requirements);

- **TOEFL**: a minimum overall score of 90 (internet-based), with a minimum score of 21 on each of the individual skill areas;
- **IELTS:** an overall band score of 6.5, with a score of at least 5.5** on each test band (Academic) (**6.0 for Fall 2021 admissions);
- **CAEL**: a minimum overall score of 70, and a minimum score of 60 on each subtest; and
- **Pearson (PTE Academic)**: a minimum overall score of 61, and add a minimum band score of 60.

Some applicants with qualifications from certain countries and international universities are exempt from the English language requirements. See the exemptions list:
https://www.ualberta.ca/graduate-studies/prospective-students/international-admissions-protocol/english-language-proficiency/recognized-countries-institutions.html

Complete the online application form

Applications for graduate admission must be submitted online.
http://www.gradstudies.ualberta.ca/apply/onlineapplication.aspx

The online application enables you to follow the documents that are submitted and added to the file.

Pay the application fee

A non-refundable application fee is required to apply.

Please upload the following documents

- A current curriculum vitae/resume.
- Statement of Interest - one or two pages summarizing your background in Biochemistry, an explanation of why you wish to pursue graduate studies, and your future career goals.
- **Official** transcripts from all colleges or universities attended (with the institution seal, date and appropriate signature).

- **Official** translation of foreign transcripts with the original transcript in English and the original language.
- If original transcripts cannot be obtained, applicants should supply certified true copies of original transcripts and certified statements confirming degrees awarded and academic standing achieved. Certification of transcripts and degrees must be affected by imprinting them with the official seal of the institution or by endorsing them by hand with the original signature of the responsible university officer (eg, Registrar, Admissions Officer, or President).
- Original document of proof of English proficiency (if the undergraduate degree is from a non-English university).
- **Three references** from persons (preferably professors) who are knowledgeable about the applicants academic and research potential and capabilities. The letter submitted must be on letterhead and signed by the referee.
- A list and description of all biochemistry courses taken (if not from the University of Alberta).
- If applicable, copies of research papers or publications

Incomplete applications will not be reviewed

Ensure you meet the application deadlines

- **Canadian Applicants**
  Applications for graduate admission from Canadian applicants can be accepted at any time however, students should allow a minimum of two months for processing of their application.
- **International Applicants**
  Students applying from outside Canada are advised to allow at least 4-6 months for processing of their application.
  International students who have been accepted for admission are advised to consult with the University of Alberta International Centre and contact the nearest Canadian Consulate as soon as possible.
    - The deadline for a September admission is May 15.
    - The deadline for a January admission is November 1.

Detailed information for international students is available from the University of Alberta International Centre https://www.ualberta.ca/international-student-services

Evaluation of Applicants

Applicants are evaluated by the department's Graduate Coordinating Committee (GCC) for admission and funding. Several considerations guide the evaluation:

- Academic merit
- Ability of potential supervisor to fund the project; and
- Availability of space in a particular research lab

Graduate Coordinating Committee

The role of the Graduate Coordinating Committee (GCC) is to set policies and procedures regarding the graduate program.

Section 2: Registration Procedures

Course Selection and Registration

Students are responsible for ensuring that their programs are planned in accordance with degree specifications, and for the completeness and accuracy of their registration. **Students are required to register themselves each year for the Fall and Winter terms.** If assistance or Departmental approval is required, please contact the Graduate Program Administrator in writing. As of 2024, you must register yourself in the Fall and Winter terms. Registration for the spring and summer terms will be done automatically by GPS for all continuing students.

Note, if you are returning from leave, or your program requires an extension you will need to self-register for the spring/summer terms as well. This is subject to change so please watch for instructions from the Director of Graduate Studies or the Graduate Program Administrator.

Full-Time Registration Policy

Students who are admitted to any thesis-based degree program (excluding cost-recovery programs) and **who initially register as full-time students in these programs must register full-time for the remainder of their program**.

Students registered in a total of nine or more units of course weight in the Fall and Winter Term are considered full-time. Students typically register in THES 906 to maintain full-time registration during the Spring and Summer terms.

Thesis Registration

Registration in THES is restricted to those students in thesis-based graduate degree programs.

Thesis sections are scheduled according to units of course weight equivalents for registration status and fee purposes. Students should consult with the Graduate Program Administrator to determine which of the thesis sections is appropriate. The selection will depend on the amount of time that the student will devote to work on the program. By registering in the appropriate Thesis designation (along with any other courses), the registration status of the student is calculated automatically.

Section 3: Graduate Courses

BIOCH 510: Signal Transduction - second term

Principles of the biochemistry of cell communication and signal transduction through receptor activation, the generation of second messengers, and the control of protein modifications. The course will emphasize the mechanisms responsible for the regulation of cell migration, division and death.
Prerequisites: BIOCH 310, 320 and 330, or BIOCH 203 and 205, all with a minimum grade of B-, or consent of the Department.
Notes:

(1) Lectures are the same as for BIOCH 410, but with additional assignments and evaluation appropriate to graduate studies.
(2) This course may not be taken for credit if credit has already been obtained in BIOCH 410.

BIOCH 520: Protein Chemistry, Structure, and Function - second term

Protein chemistry and purification. The intra- and intermolecular forces that determine protein structure. Principles of protein folding and dynamics. Enzyme mechanisms and ligand binding interactions.

Prerequisites: BIOCH 320, or BIOCH 203 and 205, all with a minimum grade of B- or consent of Department.

Notes:

(1) Lectures are the same as for BIOCH 420, but with additional assignments and evaluation appropriate to graduate studies.

(2) This course may not be taken for credit if credit has already been obtained in BIOCH 420.

BIOCH 530: Biochemistry of Eukaryotic Gene Expression - first term

The organization and expression at the molecular level of information encoded in the nucleic acids of eukaryotic cells. The focus will be on genome structure and the regulation of gene expression at the levels of transcription, post-transcriptional processing, translation, post-translational modification and protein sorting. Recombinant DNA technologies and genetic engineering will be discussed as methods for studying the cellular processing of genetic information.

Prerequisites: BIOCH 320 and 330, or BIOCH 203 and 205, all with a minimum grade of B- or consent of Department.

Notes:

(1) Lectures are the same as for BIOCH 430, but with additional assignments and evaluation appropriate to graduate studies.

(2) This course may not be taken for credit if credit has already been obtained in BIOCH 430.

BIOCH 541: Structure and Function of Biological Membranes - first term

Survey of the structure and function of biological membranes. Topics include the structure, properties and composition of biomembranes, characterization and structural principles of membrane lipids and proteins, lateral and transverse asymmetry, dynamics, lipid-protein interactions, membrane enzymology, permeability, and biogenesis.

Prerequisites: BIOCH 320, or BIOCH 203 and 205, all with a minimum grade of B- or consent of Department.

Notes:

(1) Lectures are the same as for BIOCH 441, but with additional assignments and evaluation appropriate to graduate studies.

(2) This course may not be taken for credit if credit has already been obtained in BIOCH 441.

BIOCH 565: Methods in Molecular Biophysics

Survey of biophysical methods used in the characterization and structural determination of biological macromolecules, from ensemble measurements to single-molecule detection. Topics include mass spectrometry, optical spectroscopy, light microscopy, X-ray and neutron diffraction, electron microscopy, molecular dynamics and nuclear magnetic resonance. Emphasis is on using techniques in evaluating structure-function relationships through the discussion of representative macromolecular systems.

Prerequisites: BIOCH 320 with a minimum grade of B- or consent of the Department. This course cannot be taken for credit if credit has already been obtained in BIOCH 460.

Coordinator: Dr. H. Young

BIOCH 609: Macromolecular Structure Analysis - second term
Principles of X-ray crystallography as applied to the study of protein and nucleic acid structure. Practical aspects of diffraction and structure solution are demonstrated by a collaborative study of a suitable small molecule of biological interest. Designed for senior honors and graduate students.
Prerequisite: consent of Instructor.
Notes: Maximum enrolment of 10 students. Offered in alternate years.

BIOCH 620: Selected Topics in Protein Structure, Function, and Regulation - second term
Directed reading and seminar course, based on papers taken from recent literature of protein research. Students critically discuss the papers and give oral presentations to the class. Designed for graduate students.
Prerequisite: BIOCH 420 or equivalent, or consent of Department.

BIOCH 623: Special Topics in Research on Polynucleotides - two term
This course is a journal club and discussion group in which current research topics on nucleic acids are discussed. Specific talks range from biochemistry, genetics and microbiology to nuclear biology and clinical aspects.

BIOCH 626: Special Topics in Protein Research - two term
Seminar course for advanced students. Detailed consideration is given to recent advances in research on protein structure and function and mechanism of enzyme action.
Prerequisite: BIOCH 420 or consent of Department.

BIOCH 630: Selected Topics in Modern Molecular Biology - second term
Directed reading and seminar course, based on papers taken from the recent literature of molecular biology. Students critically discuss the papers and give oral presentations.
Prerequisite: BIOCH 530 and consent of the Department.
Note: designed for graduate students; offered yearly.

BIOCH 640: Special Topics in Research on Biomembranes - two term
Seminar course for advanced students covering selected topics from the current literature in the field of membrane structure and function.
Prerequisite: BIOCH 441 or consent of Department.

BIOCH 641: Selected Topics on the Structure and Function of Biological Membranes - first term
Directed reading and seminar course on the structure and function of biological membranes. Topics include membrane biogenesis, bioenergetics, transport and structural aspects of membrane lipids and proteins.
Prerequisite: BIOCH 441 or consent of the Department.

BIOCH 665: Special Topics in Protein Folding and Prion Diseases
Seminar course for advanced students focused on recent advances in research into mechanisms of protein folding and disease states caused by protein misfolding, including prion diseases.
Prerequisite: BIOCH 520 or consent of the Department.

BIOCH 670: Recent Advances in Biochemistry - two term
A seminar course on topics of current interest in biochemistry. Students will contribute to a presentation based on recent developments published in first rate journals. Attendance at all seminars

is expected.
Note: Open only to graduate students in Biochemistry.

BIOCH 671: Recent Advances in Biochemistry - two term
A seminar course on topics of current interest in biochemistry. Students will contribute a presentation on their research project that includes original data. Attendance at all seminars is expected.
Prerequisite: BIOCH 670 or consent of the Department.
Note: Open only to graduate students in Biochemistry.

BIOCH 675: Magnetic Resonance in Biology and Medicine II - second term
Designed for advanced honors and graduate students interested in the application of nuclear magnetic resonance spectroscopy to biological systems. Topics include quantum mechanical basis of NMR, multinuclear multidimensional NMR experiments, NMR relaxation theory, new NMR applications.
Prerequisite: consent of Instructor.
Note: Offered in alternate years.

BIOCH 676: Methods in Molecular Biophysics for Analysis of Protein Kinetics, Dynamics, Interactions & Catalysis
This course will explore the development and application of kinetic models for protein interactions, dynamics, and enzyme catalysis that include the principle of microscopic reversibility/detailed balance. Focus topics may include, but are not limited to: numerical methods for fitting and analyses of experimental kinetic data derived from spectroscopic techniques, as well as blending of all-atom and coarse-grained molecular dynamics methods with experimental data to develop detailed molecular insights into proteins of biological interest.
Prerequisites: BIOCH 420, 465, or equivalent and consent of the instructor.
Note: Offered in alternate years.

Section 4: Degree Program Requirements

The Master's Degree

MSc students are required to have a cumulative GPA of not less than 3.0 in non-seminar courses taken during the graduate program. Failure (a grade of C+ or lower) in two one-term courses or in a single two-term course will normally result in an automatic recommendation to terminate a student's program unless the student's cumulative GPA at that time is 3.0 or higher.

All candidates for the MSc degree must prepare an acceptable thesis describing the results of their research activities, and be examined orally on the thesis by a committee formed according to the Faculty of Graduate and Postdoctoral Studies (GPS) regulations.

MSc students funding is guaranteed for 3 years and the program must be completed within 4 years.

Students who are initially MSc candidates can have their status changed to the PhD stream on the recommendation of their supervisory committee and approval of the Graduate Coordinating Committee (GCC) following one or two years of satisfactory performance in course work and research.

- The decision to transfer from the M.Sc. program to the Ph.D program or to remain in the M.Sc. program should normally occur **before the end of the second year**, prior to September 1st of the

third year.
- Transfer from the M.Sc. to the Ph.D. program after September 1st of the third year will only be considered if significant changes in the student's research have occurred after this time.

The Department of Biochemistry does not require knowledge of any language other than English for the MSc degree.

The Doctoral Degree

To be eligible for a PhD degree, students are required to have a cumulative GPA of not less than 3.3 in non-seminar courses taken during the graduate program. Failure (a grade of C+ or lower) in two one-term courses or in a single two-term course will normally result in an automatic recommendation to terminate a student's program unless the student's cumulative GPA at that time is 3.0 or higher.

Candidates entering the PhD program directly will prepare a PhD Thesis proposal and have a Thesis Proposal Meeting within the first 18 months of starting their program.

The PhD Thesis Proposal follows a defined format:

- Summary of literature; introduction to the student's topic; presentation of preliminary results
- Hypotheses
- Description of project including methods

This document is prepared in consultation with the Supervisor. It focuses on the projected, future research that will form the basis of the PhD thesis work. It should be hypothesis-driven and be supported by the preliminary data generated by the student.

- The document should not exceed 5 single-spaced pages, excluding figures, tables, and references.
- The Thesis proposal must be submitted to the Supervisor, all members of the Supervisory Committee and the Director of Graduate Studies, at least one week before the scheduled meeting.
- The work proposed in the Thesis Proposal must be feasible for completion by the student based on the resources and expertise available.

PhD Thesis Proposal Meeting:

- At the PhD Thesis Proposal Meeting, the student will present their PhD proposal in a brief 20-minute oral presentation that is prepared with the assistance of the Supervisor.
- The presentation will be followed by a 40-minute question period focused on the proposal.
- The Committee shall evaluate whether the proposed work is of sufficient novelty, quality and quantity to satisfy the requirements of a PhD.
- Note that it is common during the question period for Committee members to provide feedback and suggestions to improve the proposal.
- The Committee will also decide on the suitability of the candidate to advance to the PhD program.
- Successful completion of this step requires a unanimous positive decision that will be communicated to the student (and Director of Graduate Studies and Graduate Program Administrator) by the Supervisor at the meeting (or within one week of the meeting).

Possible Outcomes of the PhD Thesis Proposal Meeting:

- If the final decision from the Supervisory Committee is positive, the department Graduate Program Administrator will submit the 'Change of Category' and 'Appointment of Supervisor(s) and Supervisory Committee' forms to GPS. Upon successful transfer, students will be designated as 'Provisional PhD Students' and become eligible to take the Candidacy Examination.
- If the final decision at the PhD Thesis Proposal Meeting is negative, the student and Supervisor will have one opportunity to submit a revised proposal in accordance with the Supervisory Committee recommendations. The timeframe for submission of the revised proposal will be determined by the Director of Graduate Studies in consultation with the Supervisor (the suggested time frame must meet program requirements for time to transfer and for completion of the Candidacy). If the second attempt to transfer to the PhD program is unsuccessful, or if the student decides not to make a second attempt to transfer from the MSc to the PhD program, the student will be given the options to complete an MSc or withdraw from the program.

PhD candidates are required to pass an oral candidacy examination. The examination is based on a research proposal written by the student and evaluated by the candidacy examination committee. **The candidacy exam must be completed within the first three years of the program.** The exam is conducted by a committee comprising the student's supervisory committee and at least one additional member of the academic staff who has not been involved in the student's research project. A student who fails the examination will normally be required to withdraw from the program.

All candidates for the PhD degree must prepare an acceptable thesis describing the results of their research activities, and be examined orally on the thesis by a committee formed according to the Faculty of Graduate and Postdoctoral Studies (GPS) regulations.

PhD students funding is guaranteed for 5 years and the program must be completed within 6 years.

The Department of Biochemistry does not require knowledge of any language other than English for the PhD degree.

Course Requirements

All candidates for the MSc or PhD degrees must include some course work in their program.

MSc students are required to complete equivalent to at least two full-year (or 4 single-term) courses (13 course weights): BIOCH 670 (4 credits); BIOCH 671 (4 credits); BIOCH 6xx journal club (2 credits); one of BIOCH 609, 620, 630, 641, 675 or 676 (3 credits).

PhD students are required to take the equivalent to at least two and one-half full-year (or five single-term) courses (16 course weights): BIOCH 670 (4 credits); BIOCH 671 (4 credits); BIOCH 6xx journal club (2 credits); one of BIOCH 609, 620, 630, 641, 675 or 676 (3 credits); BIOCH 5xx or 6xx (3 credits).

Students entering their graduate programs without the appropriate advanced level undergraduate courses in the major areas of biochemistry will be required to take additional course work. In particular, students who have not taken any advanced biochemistry courses may be required to enroll in some 500-level courses in addition to the minimum course requirement.

Didactic Courses

All graduate students are required to take at least 1 Biochemistry course at the 600- level. The current list of courses that satisfy this requirement included BIOCH 609, 620, 630, 641, 675 and 676. These

courses are directed reading courses in which graduate students are challenged to analyze and critique current research papers on selected topics.
PhD students are required to take an additional graduate level course in Biochemistry (500 or 600 level) or an approved graduate course in another department. These requirements are the minimum and students who wish to take additional courses to enhance their background to or development expertise in additional research areas are encouraged to do so, in consultation with their supervisor and committee.

Seminar Courses and Journal Clubs

All graduate students are required to enroll in the seminar courses BIOCH 670 and BIOCH 671.

- BIOCH 670 will be taken for credit in the first year of the program. Students will present one literature-based seminar on 1-2 peer reviewed scientific publications. This is usually taken in the Winter Term for new students starting in Fall Term.
- Second year graduate students will register in BIOCH 671. Students will present a seminar on their research in the fall term of their second year.

Students are graded independently for BIOCH 670 and 671 and are **required to attend these seminar series regularly during all years of their program**.

All graduate students must enroll once for credit in a relevant specialized journal club course, such as BIOCH 623, 626, 640 or 665. The BIOCH 670, BIOCH 671 and journal club courses fulfill 10 course weights of the minimum course requirements. Abstracts and seminar notices must be submitted to the Grad Program Admnistrator.

Department of Biochemistry
Graduate Program Course Requirement Checklist

Name:_____ Program:_____

Admit Date:_____ Supervisor:_____

MSc candidates must include course work in their program, equivalent to at least two full- year (or **four** single-term) courses or 13 course weights. PhD candidates must include course work in their program, equivalent to at least two and one-half full- year (or **five** single-term) courses or 16 course weights. BIOCH 670, BIOCH 670 are required. One Journal Club is required. One didactic 600 level course is required (not a journal club). At least one more course, didactic 600 or 500 level (not a journal club) is required.

Required Seminars:	BIOCH 670 (*4) [ ] BIOCH 671 (*4) [ ]	670 and 671 are mandatory for all students.
One Journal Club:	BIOCH 623 (*2) [ ] BIOCH 626 (*2) [ ] BIOCH 640 (*2) [ ] BIOCH 665 (*2) [ ]	Students should participate in the appropriate Journal Club each year but register for credit one time during the graduate program.
Didactic 600 level:	BIOCH 609 (*3) [ ] BIOCH 620 (*3) [ ] BIOCH 630 (*3) [ ] BIOCH 641 (*3) [ ] BIOCH 675 (*3) [ ] BIOCH 676 (*3) [ ]	All students require one or more of the didactic 600 level courses.
500 level course:	BIOCH 510 (*3) [ ] BIOCH 520 (*3) [ ] BIOCH 525 (*3) [ ] BIOCH 530 (*3) [ ] BIOCH 541 (*3) [ ] BIOCH 565 (*3) [ ]	Students may take 500 level courses to complete the requirement for 16 course weights.

Students are permitted to take graduate level courses outside the department to meet their requirements if the supervisor and Director of Graduate Studies approve the courses.

Professional Development

As part of your graduate degree, students are required to participate in professional development (PD). There are two parts to the PD requirement.

Part 1: Individual Development Plan (IDP) - a self-assessment booklet.
Part 2: 8 hours of Professional Development activities

The IDP should be completed within the first year of the graduate program (up to 18 months for doctoral students). This can be done independently, or as part of a discussion with your supervisor or Grad Program Administrator. There are tutorials and orientation tools available on the GPS Professional Development webpage. Once you have completed your IDP please forward it to Dr. Joanne Lemieux and the Graduate Program Administrator (bcgrad@ualberta.ca). Record of completion must be recorded for graduation.

To aid with part 2, the Biochemistry Department offers BIOCH 660: Professional Development for Career Success course every two years. The activities involved in the program can count towards the 8 hours of PD activities. There are also many activities offered throughout the year from GPS and career services. Watch the student digest for details.

It is important to track the PD activities that you have participated in. You can use the tracking form available on the GPS website, or at the end of this document, to register your activities. Once your minimum 8 hours have been completed, send the form to Dr. Joanne Lemieux and the Grad Program Administrator (bcgrad@ualberta.ca).

Please be aware you will not be able to submit your thesis nor graduate without both components of the PD requirement.

Career Development Courses

BIOCH 660 - Professional Development for Career Success

The goal of this course is to provide training in the skills required to succeed in the modern work place. The course will take the form of four-hour monthly sessions, consisting of group discussions, lectures, short assignments and student presentations. There will be presentations by highly successful Ph.D. alumni, which will serve as case studies in how the transition from graduate school to the workplace can occur, and what pitfalls need be avoided in the workplace. Course is graded on cr/nc, students must attend the classes and complete required assignments.
Note: Offered in alternate years
Open to graduate students in the Department of Biochemistry and other graduate students with permission of the course instructor.

BIOCH 698/699 - Undergraduate Research Mentoring

A credit/no-credit course for graduate students who are actively participating in the mentorship of undergraduate students in a half term research course (e.g. BIOCH 398, 498 and 499) in the Department of Biochemistry. Mentorship includes activities such as in lab supervision, training, and help with reports and presentations. Can be taken in any year and Spring/Summer session. Credit may be obtained more than once. Requires the submission of an initial project summary with student learning objectives, monthly progress and final reports.
Prerequisite: Consent of the Department of Biochemistry.

Graduate Teaching + Learning Program

Learn how to become an effective educator. The Graduate Teaching and Learning Program (GTLP) is a multi-tier program designed to help you excel in your role as a teaching assistant and beyond. Offered through the Faculty of Graduate and Postdoctoral Studies. As you complete each level and meet all the requirements, you'll be issued letters of completion. Notations will also be added to graduate students' transcripts.

Academic Integrity and Ethics Training Requirement

Graduate degree requirements include a mandatory Academic Integrity and Ethics component.

As of September 2022, the normal requirements of this training component are the successful completion of the following courses:

- MSc students are required to complete the INT D 710 course in their first term (6 hour online course)
- PhD students are required to complete the INT D 710 course in their first term (6 hour online course) and the INT D 720 (2 hour online course) in the next term, or the first term after transitioning to the PhD program. **Both courses should be completed prior to the candidacy exam**

New students are automatically registered in their respective courses at the start of their program. See the Faculty of Graduate Studies Ethics + Academic Citizenship Requirement webpage for more details. https://www.ualberta.ca/graduate-studies/professional-development/academic-integrity-ethics-training.html

The Department of Biochemistry requires these courses be completed within the first two years of the MSc and PhD programs.

Students who started their academic programs **before September 2022** are required to complete 8 hours of training. Students should have completed the GET Program (Graduate Ethics Training) online course (5 hours of training) and can complete the remaining three hours of the six-hour requirement through a combination of workshops and online courses. See the Faculty of Graduate Studies Ethics + Academic Citizenship Requirement webpage for more details.

- The Annual Ethics and Scientific Integrity Days. (5 hours of training).
- Introduction to Ethics, Integrity, and Responsibility in the Laboratory for First Year Graduate Students. (1 hour of training).
- The Care and Use of Animals in Research, Teaching and Testing (includes proper care and handling of animals). (1.5 hours of training).
- The Radiation Safety Course. Completed in accordance with the Nuclear Safety and Control Act and Regulations of Canada to ensure safe and responsible laboratory conduct.

Please be aware you will not be able to submit your thesis nor graduate without the ethics requirement.

Teaching Duties

All first and second year graduate students **must** contribute to teaching responsibilities in BIOCH 200 and BIOCH 401. Every effort will be made to ensure equal distribution of responsibilities.

Academic Standing

Students are required to have a cumulative Grade Point Average (GPA) of not less than 3.3 (for the PhD program) and 3.0 (for the MSc program). In calculating the GPA, seminar courses are not included.

Failure (a grade of 2.0 or lower) in two one-term courses, or in a single two-term course, would normally result in the automatic termination of the program, unless the cumulative GPA is 3.0 or higher.

Annual Report

Each year graduate students are required to complete an annual report. This report updates the Director of Graduate Studies on student progress and also ensures degree requirements are being met on schedule.

Section 5: Responsibilities Related to Graduate Programs

Graduate Student Responsibilities and Expectations

Admission into our graduate program is a first step in what may be a long and productive career in science. To take full advantage of the opportunities graduate studies offers, both now and in the future, you should understand the responsibilities and expectations. Once your supervisor has been determined, you and your supervisor will be required to create **Student-Supervisor Guidelines** together. Please ensure you understand what was discussed. If you need clarification please communicate this to your supervisor, or contact the Director of Graduate Studies for assistance.

Graduate students are ultimately responsible for their own programs. They are expected to read the Calendar and any other relevant documents to become familiar with all regulations and deadlines relating to their programs.

The students' fundamental responsibilities include ensuring that their registration is accurate and does not lapse, submitting appropriate forms to the department for signature and processing, and paying all fees required by the deadline dates set out in the Calendar.

Graduate students should:

- make themselves aware of the contents of the graduate portions of the Calendar and take responsibility for their own programs in that the Calendar sets out the requirements for the various programs;
- maintain open communication with their supervisor and Director of Graduate Studies concerning any problem either real or perceived;
- inform the supervisor regularly about progress, and provide the supervisor with an annual report for distribution to the supervisory committee;
- make research results accessible (beyond their appearance in a thesis) to an appropriate audience;
- be aware of deadlines for possible scholarship applications, and seek advice and assistance from the department in making applications, etc.

Research Expectations

All graduate students are expected to have a supervisory committee formed within 12 months of

admittance, and to meet with their committee at least once per year. It is important to involve the members of your committee early and often. You will be expected to submit a progress report which will be signed by your supervisory committee, and then submitted to the Director of Graduate Studies. The purpose of your supervisory committee is to ensure your graduate education experience is the best it can be.

1. Your research is expected to make a significant contribution to the body of knowledge in the area of the thesis and generate original data suitable for publication in peer-reviewed journals. Publication of research results is one standard by which you will be judged by your peers. The following are suggested guidelines:
    a. Aim to publish in top-tier journals in your area of research.
    b. Produce 1-2 peer-reviewed publications from an MSc thesis.
    c. Produce 3-5 peer-reviewed publications from a PhD thesis.
    d. Present your findings at suitable regional, national, and international meetings.

2. Departmental activities should be a high priority for graduate students because they expose students to a broader spectrum of scientific knowledge than can be offered by any single laboratory. They also provide an opportunity to develop presentation skills and offer possibilities for networking. All graduate students are expected to participate in Departmental activities including:
    a. Department of Biochemistry Seminars.
    b. Recruitment Candidate Seminars.
    c. Thesis Defense Seminars.

3. All graduate students are expected to devote their full-time efforts to research, teaching and courses. **Stipend support is provided to allow full attention to these responsibilities** and the Department expects a high level of commitment to them. Any additional commitments that impair a student's ability to meet these responsibilities may not be undertaken without permission of your research supervisor. The stipend is not a wage, but support to allow you to pursue a graduate degree. You are entitled to three weeks' vacation per year. Vacations or leaves should be arranged in consultation with the supervisor to minimize the negative impact on research in the laboratory.

4. Graduate students are expected to work in a group or team environment. Regular communication with the supervisor is essential for a healthy and productive relationship. Students should respect the work and equipment of others and be aware that facilities or resources are often shared. The workplace must be safe, tidy and healthy for all. Students should be thoughtful and economical in using lab resources. Students must maintain good records of their work.

5. All original research materials (notebooks, tapes, computer hard drives, and disks, etc.) must remain with the supervisor upon completion of the degree. These items belong to the University of Alberta. You are entitled to retain a copy of all materials.

6. Graduate students are expected to uphold the high standards of research and the integrity. Students should familiarize themselves with the Intellectual Property Guidelines of the University of Alberta.

Program Expectations

1. Students must maintain a GPA of 3.3 to remain in the PhD Program.
2. Students must maintain a GPA of 3.0 to remain in the MSc Program.
3. All students, regardless of the source of their stipend, must participate in undergraduate teaching associated with Biochemistry 401. You will need to communicate with the course coordinator to understand your responsibilities.
4. **A maximum** of 4 or 6 years between entering the graduate program and completing all requirements for the MSc and PhD is permitted, respectively.
5. All candidates for graduate degrees must include at least five (5) single-term courses (13 course weights for MSc and 16 course weights for PhD) in their program.

General Expectations

Graduate students:

- Are creative and broad-minded.
- Set clear research and career goals.
- Integrate ideas, methods, skills, and knowledge to fulfill research and career goals.
- Must take the initiative and responsibility for their graduate programs.
- Are productive and demonstrate their talents through high quality peer-reviewed publications.
- Are goal-oriented rather than time oriented. Research is not a job, but a career and a passion.
- Are aware that a degree is awarded for scholarship, not for marks, hours in the lab, or data collection.
- A PhD is awarded for independent and innovative thinking.
- Develop excellent communication skills.
- Regularly read the literature.
- Recognize that enthusiasm, optimism, and dedication are the best path to success.
- Are available to others. Research is usually a team activity.
- View graduate school as professional development; science and research offer life-long opportunities for professional growth and development.
- Are 'junior colleagues in research' and not employees or technicians.

Responsibility of the Supervisor:

The supervisor is directly responsible for the supervision of the student's program. In this capacity, the supervisor assists the student in planning a program, ensures that the student is aware of all program requirements, degree regulations, and general regulations of the department and the Faculty of Graduate and Postdoctoral Studies (GPS), provides counsel on all aspects of the program, and stays informed about the student's research activities and progress.

The supervisor is also charged with ensuring that students conduct their research in a manner that is as effective, safe, and productive as is possible.

The supervisor must prepare a program of studies for the student, arrange for and attend all supervisory committee meetings and examinations, ensuring that these are scheduled and held in accordance with GPS regulations, and must review the thesis both in draft and in final form.

The supervisor with the support of the home department should:

- provide an environment for the student that is conducive to research and in which the student

can grow intellectually;

- provide appropriate guidance to the student on the nature of research and the standard expected, and be accessible to give advice and constructive feedback; at the beginning of the supervisory relationship, the student should be made aware of the normal expectations held by the supervisor and the department;
- with the student establish a realistic timetable for completion of various phases of the program;
- consider a graduate student as a "junior colleague in research";
- ensure that there are sufficient material and supervisory resources for each graduate student under supervision;
- work with the student to establish the supervisory committee as soon as possible after the start of the program and ensure that it maintains contact and **formally meets at least once a year** with the student;
- when going on leave or an extended period of absence, ensure that the student is adequately supervised by the provision of an acting supervisor (who should be a member of the supervisory committee);
- ensure that the student is aware of his/her guidelines and, when necessary, assist the student in meeting these;
- set up committee meetings and examinations after consultation and with full knowledge of the student.

Responsibility of the Department of Biochemistry:

The term "Department" applies both to a department and to a non-departmentalized faculty (eg, Law, Nursing, Pharmacy and Pharmaceutical Sciences); or to an extra-departmental graduate program (ie; PhD in Medical Sciences, Neuroscience). The term "Department" also refers to the Chair, Director of Graduate Studies, Director, or any other individual officially designated as being responsible for graduate programs.

- The department oversees the supervision of all graduate students enrolled in its programs and serves as the chief liaison with the GPS. It is responsible for ensuring that the student receives proper supervision and that the regulations and requirements of the GPS are met.
- The department is responsible for recommending and keeping the GPS informed of any development in or changes relating to the student's program, including the appointment of the supervisor and supervisory committee members (where applicable) and changes to that membership, course and program changes, scheduling of examination dates, and so on.
- The department's Director of Graduate Studies is the official representative of the department to its graduate students.

Timeline for Students

Year One (1-12 months)

- Register for courses and thesis.
- Take **MANDATORY** Ethics Training course (INT D 710)
- Supervisory Committee must be in place
- Hold first Supervisory Committee Meeting to assess progress (progress report to be provided by student)
- Register in Biochemistry 670
- Submit Graduate Student Annual Report

Year Two (12-24 months)

- Register for courses and thesis
- Register in Biochemistry 671
- Hold 2nd Supervisory Committee Meeting to assess progress (progress report to be provided by the student)
- Inform the Graduate Program Administrator if a transfer from the MSc to PhD program is applicable (must be supported by the Supervisor and Supervisory Committee) This must be completed before year 3 of the program. Transfers can only be processed at the beginning of a term
- Prepare for Master's Final Oral Exam (if applicable)
- Submit Graduate Student Annual Report

Year Three (24-36 months)

- Register for courses (if applicable) and thesis
- Take **MANDATORY** Ethics Training course (**INT D 720**)
- Hold 3rd Supervisory Committee meeting to assess progress (progress report to be provided by the student)
- Arrange meeting with Supervisory Committee to approve PhD thesis proposal
- Candidacy examination
- Submit Graduate Student Annual Report

Year Four (36-48 months)

- Register for thesis
- Hold 4th Supervisory Committee meeting to assess progress (progress report to be provided by the student)
- Complete thesis research
- Prepare for thesis examination
- Prepare and present final thesis seminar
- Submit Graduate Student Annual Report

Code of Student Behavior:
The University is defined by tradition as a community of people dedicated to the pursuit of truth and advancement of knowledge, and as a place where there is freedom to teach, freedom to engage in research, freedom to create, freedom to learn, freedom to study, freedom to speak, freedom to associate, freedom to write and to publish. There is a concomitant obligation upon all members of the University community to respect these freedoms when they are exercised by others.

For these freedoms to exist, it is essential to maintain an atmosphere in which the safety, the security, and the inherent dignity of each member of the community are recognized. Please review the code carefully. https://www.ualberta.ca/governance/resources/policies- standards-and-codes-of-conduct/code-of-student-behaviour

Section 6: Supervisor and Supervisory Committee Members

Choosing a Supervisor

The responsibility for finding a supervisor rests with the student. Choosing a faculty member is one of the most critical decisions a graduate student will make. Several years will be spent working with the faculty member of choice and that choice will significantly affect the direction of the student's career. Choosing a supervisor is not a decision to be taken lightly. A student should seek a supervisor who is academically competent in a particular area and is always willing to act as an advocate for the student when necessary.

The student should be able to work and communicate effectively with the supervisor and not feel intimidated in the relationship. The graduate student: supervisor relationship is beneficial to both parties. Each student requires the guidance of someone who will stimulate thought and creativity and who will challenge the student to achieve his or her potential in research.

Choosing a new faculty member as a supervisor has advantages and disadvantages. In the research group of a new faculty member, graduate students often have a wider choice of projects and can expect extensive interactions with the supervisor. In the groups of more established faculty members, new students may have a more limited choice of projects and may not have daily access to the supervisor. In a new lab, equipment must be purchased and set up and new techniques must be established; these activities require time and effort, but that time and effort will contribute to a deeper understanding of the research and to your independence. In more established labs, equipment and trained personnel are already present, offering opportunities to make rapid progress in research. Choose the environment that best matches your expectations and research style. *Make an informed decision and do not let others make the decision for you.*

Selection of a Supervisor

- The selection of a supervisor is made by mutual agreement between the student and faculty member.
- The supervisor can be any faculty member with a primary appointment in Biochemistry or a cross-appointed faculty who is permitted to supervise Biochemistry graduate students.
- No faculty member is obligated to accept a student into their laboratory.
- A student must have a supervisor to remain in the program.

How to get started in choosing a supervisor:

- Find and read information about potential supervisors on the department website.
- Download and read recent publications authored by potential supervisors.
- Attend a seminar or class given by a potential supervisor.
- Introduce yourself to graduate students currently working with a potential supervisor. They are an invaluable source of information.
- Make an appointment to meet with potential supervisors.
- Consider joint or co-supervision if it seems appropriate.

Questions to ask a potential supervisor:

- How many graduate students have you supervised? How many do you currently have?
- How many hours of work per week do you expect from a graduate student? How much time do you expect students to take to complete their theses?
- Specifically, what research projects do you have available for me? How long have you been interested in these areas?
- Are funds available for a stipend and for conducting the research project?
- What level of independence do you expect of graduate students?
- Will I have the opportunity to attend conferences?
- What are your expectations in terms of productivity and research publications? Who will write the manuscripts?
- How often do you meet with your students? Do you have group meetings or meet individually with your students? Do you wish to communicate in person or by email? Do your students have regular supervisory committee meetings?
- How often do you travel? Are you planning a sabbatical soon?
- What qualities are you looking for in a graduate student?
- Do you have any other expectations of your students?

Questions you should be prepared to answer from a potential supervisor:

- What do you expect from a supervisor?
- Are there any plans that may interfere with your completing your degree? Are you considering a doctoral degree?
- Do you have any disabilities or other concerns that may need to be accommodated?
- Why do you find this area of research interesting and promising?

Supervisor and Graduate Student Relationships

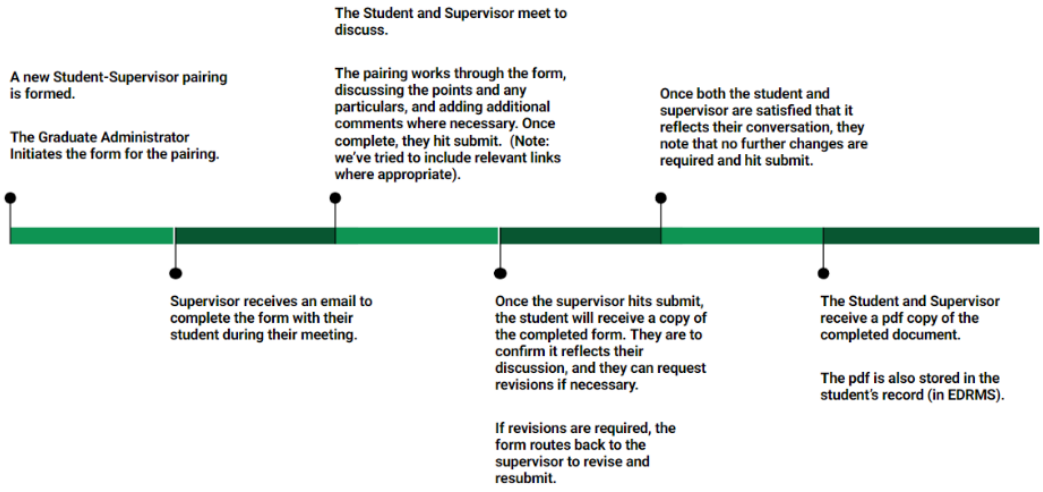
Poor graduate student/supervisor relationships can lead to negative consequences for the student, the supervisor, and the department. These consequences may be no more than aggravation, but they can also extend to damaged career prospects, damaged reputations and lawsuits. The biggest source of trouble is the clash of expectations between the student and the supervisor.

All NEW thesis-based students will need to complete a Student-Supervisor Guidelines (SSG) process with their Supervisor (and Co-Supervisor, if applicable) during an early meeting where they can meet to discuss the included topics: expectations, roles and responsibilities, modes and frequency of communications/meetings, funding supports, work schedule, authorship, data collection and stewardship, IP, among others.

Ideally **this will occur as soon as the Student-Supervisor relationship is established, and within the first term**, as the guidelines include topics that are important for new students as they begin their program. However, the form may be completed up to the end of the first twelve months in the program.

Prior to the start of the student's first term, supervisors will be sent a link to an online form. This form will need to be filled out WITH THE STUDENT at a meeting. Once the form is completed the supervisor will click submit. The form will then be sent to the student for review. The student should review the form and confirm the talking points and conclusions. At this point the student can request changes if what is written differs from what the student expected. If revisions are required, the form goes back to the supervisor for review. Once everyone is on the same page and in agreement the form will be submitted and everyone will receive a pdf copy.

Workflow:



Some suggestions for healthy student and supervisor relationships are:

- Avoid entering into an unhealthy relationship. An academic relationship does not entail that you are drinking buddies or close personal friends. Avoid any relationships that create a conflict of interest. Choose your relationships carefully by making informed choices based on research and interviews.
- Clearly communicate your expectations and listen carefully to the other person's expectations before committing. Once established, lay out milestones in your program and revise them together as needed.
- Good relationships require good management. This relationship is too important to be anything but scrupulously professional and respectful. A supervisor should be academically supportive but should not become a part of the student's emotional support group. The university has a wide variety of student services available, and a supervisor should refer students to the appropriate university resource for assistance.
- Keep track of all discussions and decisions. Retain all emails and notes. After meetings one party should be responsible for sending an email summary of the discussion to the other person.
- When problems do arise, deal with them early. Try to resolve the problem through direct

communication. Present rational arguments, not emotional ones.

- When necessary, seek advice or assistance from colleagues, the Director of Graduate Studies, the Chair, the Graduate Ombudsperson, or the Associate Dean of the Faculty of Graduate and Postdoctoral Studies (GPS).
- Assessments of performance are part of every student/supervisor relationship. Feedback should be given calmly and productively.
- Don't say something you wouldn't say in front of an appeal board (something you can back up with facts). Provide written feedback whenever possible.
- Consider co-supervision to preserve or enhance a difficult relationship.
- Respect confidentiality. Only share information on a 'need to know' basis.
- Not all students will complete their programs. Termination of a program is a last resort after all options have been exhausted. A supervisor should consult appropriately, make the decision in consultation with the supervisory committee, document the reasons and allow the appeal process to take its course if it is invoked.

Supervisory Committee Members

After a new student chooses a supervisor, **a supervisory committee should be appointed within three months**. If the supervisor is an adjunct appointment to the department, another biochemistry faculty must serve on the committee.

As minimum criteria, supervisors and committee members must:

- normally be full-time faculty
- be active in the general area of the student's research
- have a tenured (or tenure track) faculty appointment (including soft tenure track faculty appointments such as University Research Fellows and Heritage Scholars) in a department relevant to the field
- hold a degree equivalent to or higher than that for which the student is a candidate. (This would always be the case for newly appointed faculty, but certain recognized and well-established exceptions should be respected.)
- demonstrate continuing scholarly or creative activity of an original nature

Because of diverse interpretations of the term "scholarly or creative activity", the Faculty will always find it necessary to rely on sound and informed judgment of Chairs and Directors of Graduate Studies to ensure adherence to minimum faculty criteria.

The determination of "scholarly or creative activity" assumes a continuing peer review process that, at least indirectly, is included annually at the appropriate Faculty Salaries and Promotions Committee. The following list summarizes criteria used by various faculties to describe scholarly or creative activity:

- publication of research papers in refereed journals
- publication of research papers in journals acceptable to the discipline
- publication of books and/or monographs
- publication of research findings in conference proceedings
- publication and/or performance of new compositions or plays
- exhibition of new artistic works
- peer recognition of outstanding professional practice
- invitations to speak at conferences or at other institutions
- editorial or refereeing responsibilities for journals

- invitations to serve as external examiner for the PhD
- presentations at professional society meetings or workshops
- invitations to review grant proposals or manuscripts
- invitations to referee requests for promotions to full professor in recognized institutions
- additional criteria approved by the Dean, GPS may be added by individual departments, and should be included in departmental graduate handbooks.

"Grey" Areas— Individual Categories Eligible for Supervisors and Committee Members
There are several potentially "grey" areas relating to eligibility for graduate supervision and committee membership, including such categories as retired professors, professors from departments not offering a graduate program, clinical appointees, adjunct professors from outside the University, sessionals, faculty service officers (FSOs), postdoctoral fellows (PDFs), research associates, and experts from outside the University.

For approval of the following categories the department shall formally apply to the Dean, GPS:

- retired professors or professors emeriti
- professors from departments not offering a graduate program
- clinical appointees
- adjunct professors who do not hold academic appointments at the University of Alberta

The request for supervision or committee membership approval should include a memo indicating the reasons for, and the benefits of, having such a colleague as co-supervisor or on the proposed supervisory or examining committee, and the proposed individual's current CV.

If approved, the colleague will remain eligible for appointment to new committees for three years.

Appointments will only be made of those individuals expected to be able to remain on the committee until completion of the student's degree program. Should there be a change in the relationship between the home department and the approved appointee, the department should assess the implications and inform the Dean, GPS.

In all cases colleagues from the following groups should be active in a scholarly or creative activity as demonstrated by satisfying an appropriate set of criteria from among those listed previously.

Retired Professors or Professors Emeriti may serve as co-supervisor or as a supervisory committee member after the initial decanal approval outlined above.

The other co-supervisor should be from the student's home department. They may serve as examining committee members in the same manner as continuing academic staff. The Dean may waive the approval mechanism where circumstances warrant.

Request for supervisors who have taken early retirement will be dealt with by the Associate Dean, GPS on a case-by-case basis. The guiding principle will be that faculty who take early retirement can continue to supervise the graduate students they already have, as long as the chair of the department approves.

Professors from Departments not offering a graduate program may serve as co-supervisors or as members of supervisory or examining committees after initial decanal approval.

Clinical Appointees may serve as co-supervisors or as members of supervisory or examining committees after initial decanal approval. They may sit on examining committees as fully enfranchised members but additional to the normal complement of University examiners.

It is imperative that clinical appointees serving as co-supervisors or on supervisory committees be readily accessible to the student for the duration of the program. They may be "internal-externals" only if they come from units with doctoral programs.

Adjunct Professors who do not hold academic appointments at the University of Alberta may serve as co-supervisors or as members of supervisory or examining committees after initial decanal approval. They may serve on candidacy or final examining committees as fully enfranchised members but additional to the normal complement of University examiners. They may not serve as the "internal/external" committee member.

Additional categories:
Experts from outside the University may, if approved by the Associate Dean on an ad hoc basis, serve on examining committees as fully enfranchised members but additional to the normal complement of University examiners.

The GPS interpretation is that this category includes First Nations' Elders where appropriate, given the academic and cultural context of the student's research program. Departments must indicate why this individual is considered an Elder and justify his/her inclusion on the committee as an Elder.

For off-campus experts, there should be an indication of the means by which meaningful interaction can be maintained.

Adjunct Professors from inside the University may serve as supervisors, co-supervisors or as members of supervisory or examining committees in the department where they hold the adjunct appointment, but they are not to serve as the "internal-external" committee member. They are not required to be extra to the committee. Initial decanal approval is not required.

Sessionals, Research Associates, FSO's, and PDF's are not eligible to serve on committees, unless recommended by a Chair and approved by the Dean on an ad hoc basis.

Supervisory Committee Meetings

Supervisory Committee Meetings must be held at least once per year. This meeting is arranged by the Supervisor.

Students must provide a brief written report (no more than 10 double-spaced pages) outlining their research activities. The report must be sent to the Supervisory Committee at least 5 business days in advance of the committee meeting.

The Supervisor will complete a Report of Supervisory Committee Meeting form (Appendix A) which outlines the student's progress and outlines specific recommendations. The report is signed by the student and the supervisor and held in the student's permanent file.

Section 7: Program Transfer from MSc to PhD Programs

A Master's student can request to be transferred to the PhD program. To be considered for promotion, the following guidelines must be adhered to:

- A minimum Grade Point Average (GPA) of 3.3 in all non-seminar courses should normally have been attained.
- The decision to transfer should normally occur before the end of the second year, prior to September 1, of the third year.
- The student has demonstrated that they are capable of significant original research work.
- The student commands an adequate, growing and critical knowledge of the discipline and of the subject matter relevant to the thesis.
- The student is developing originality and creativity relevant to the thesis.
- The student displays the enthusiasm, drive and commitment expected of a doctoral student.

Procedure and Requirements

- Students enrolled in an MSc program wishing to transition to a PhD program without first completing the MSc should inform their Supervisor as early as possible.
- To initiate the transfer process, the student must first obtain approval from their Supervisory Committee typically 1-2 months prior to the desired transfer date.
- If approval to proceed with the transfer process is granted, the Supervisor schedules a PhD Thesis Proposal Meeting with the Supervisory Committee, at which the student will present and defend their PhD Thesis proposal (See PhD Degree Program Requirements).

Section 8: Doctoral Candidacy Examination

The Doctoral Candidacy Document

The Doctoral Candidacy exam is a qualifying exam to determine if a student can perform at the level expected of a PhD student. It is to determine whether a student has a sufficient breadth and depth of knowledge related to the thesis topic and displays the ability to design and perform original research.

Purpose of the Candidacy Examination

The Candidacy Examination is an important learning opportunity to help students consolidate their understanding and advance their thinking in the subject area related to their research.

The examination is also to establish that the student has:

- Proficient knowledge of their research subject area.
- The ability to develop, pursue and complete original scientific research at an advanced level, which requires (in addition to knowledge of the discipline) an understanding of experimental design, critical thinking abilities and communication skills

Procedures, Requirements and Timeline

The Candidacy exam takes place by the end of the third year with consent of the supervisor and supervisory committee.

The exam consists of:

- A written research proposal.
- A 15 - 20 minute presentation of the proposal.
- An oral examination to defend the proposal.

Process:
Step 1: If you have not already, arrange a committee meeting where you propose your topic for your candidacy and create a timeline and date for when to hold the exam. Usually all required coursework will be completed by this time.

Step 2: When ready to begin the Candidacy Examination process, the student meets with the Director of Graduate Studies to review the process and expectations.

Step 3: Ideally 2 months before, identify the examining committee and determine a tentative exam date. This is the supervisor's job.

Step 4: Seven weeks prior to the date of the Candidacy Examination the student submits a 1-page Proposal Summary to the Director of Graduate Studies and members of the Supervisory Committee for preliminary approval of the topic and scope. The Proposal Summary must include the following:

- Title.
- Hypothesis(es) and rationale for the proposed research.
- Background: Provide a brief overview of background information needed to explain the novelty and importance of the proposed hypothesis.
- Goal(s)/Research Aims: Describe the overall goal(s), the proposed research and the specific aims that will test the novel hypothesis.
- Methods/Approaches/Expertise: Provide a brief overview of relevant experimental methodologies and how these will be used to address each of the research aims. It is expected that the student will have knowledge of all of the approaches proposed.
- Expected Outcomes: Describe the expected outcomes of the proposed research, both in terms of specific experimental outcomes as well as the more general implications of the proposed research, highlighting its significance and how it will advance knowledge.
- **Note** - students are encouraged to include their most original and creative ideas in the proposal.

The Supervisory Committee will have 1 week to review the Proposal Summary to determine the suitability of the topic and scope. The Director of Graduate Studies can be consulted as needed Supervisory Committee decision outcomes:

- If the 1-page Proposal Summary is approved, the Supervisor/Supervisory Committee will inform the student, the Director of Graduate Studies and the Grad Program Administrator. **The student has 4 weeks to write the full Candidacy Research Proposal and submit it to the Candidacy Examination Committee**.
- If the Proposal Summary is rejected, the student will be provided with feedback and have the option to modify the Proposal Summary or select a new topic. In either case, the student will have 1 week to submit a revised or new Proposal Summary. The Supervisory Committee will have 1 week to review the revised Proposal Summary. This adds two additional weeks to the process (9 weeks from initial submission of a preliminary 1-page Proposal Summary). Reasons

for rejection of a proposed topic include, but are not restricted to, significant overlap with current lab projects, lack of creativity and scope, scientifically unsound ideas, poor experimental design, and substandard writing.

Step 5: Ideally 1 month before, have a date set and an arm's length examiner confirmed. The Graduate Program Administrator will assign a neutral chair for the exam, confer with the supervisor to ensure a suitable room is reserved and create the notice of exam form for the supervisor to sign.

Step 6: At least 2 weeks before the exam date the student must send the proposal to the committee and chair.

Step 5: The day of the exam the student and committee will convene in the exam room at the appointed time and the chair will ensure that the required examination procedure is followed.

The examining committee

The Doctoral Candidacy examining committee is composed of 4 University of Alberta Faculty members. This will typically consist of the student's supervisor, two supervisory committee members and one "arms-length examiner". An arms-length examiner is an individual that is: not a member of the supervisory committee; not connected with the thesis research in a significant way; not associated with the student outside of usual contact in courses or other non-thesis activities; and not a close collaborator of the supervisor. An arms-length examiner may be from the same or another department and may serve as an arms-length examiner for both the candidacy and Doctoral final examination.

The Doctoral Candidacy Document

The Candidacy document is a written research proposal that should take the form of a grant application to a funding agency such as the Canadian Institute for Health Research (CIHR). This document is to be a research proposal and as such the primary focus should be placed upon experiments and research that the PhD candidate proposes to do rather than on data that has already been collected. Normally the Candidacy document will be a proposal for research that the PhD candidate is proposing to perform to complete their PhD thesis but should extend well beyond the original plans for the thesis research.

Specific Considerations

The format for the Candidacy Research Proposal is as follows:

- A cover page with the title of the proposal, the student's name, and the date, time, and location of the examination.
- A 1-page research summary (updated from the original 1-page Proposal Summary submitted for pre-approval).
- The research proposal can be no longer than 10 pages. Up to 5 additional pages can be included for Tables and Figures.
- A complete list of citations with titles (this is not included within the 10-page limit).

Formatting Guidelines:

- Use 8.5" x 11" page format.
- All margins should be set at 2 cm (top, bottom, left, and right).
- Text should be in single-spaced 12-point Times New Roman font, allowing for 48 lines per page.
- Condensed fonts or line spacing are not permitted.
- Page numbers must be clearly displayed at the bottom of each page.

- Any text exceeding the specified limits will be ignored, except for references.
- Tables and Figures should be legible when viewed at 100%.

Content Guidelines:

- Effective proposals are often divided into the following sections:
    - TITLE
    - HYPOTHESIS AND RATIONAL FOR THE PROPOSED RESEARCH
    - BACKGROUND AND SIGNIFICANCE
    - SPECIFIC AIMS/GOAL(S)
    - RESEARCH DESIGN AND METHODS
    - EXPECTD OUTCOMES
    - TIMETABLE (optional)

- The TITLE of your project is important and sets the first impression. Make it descriptive, specific and reflect the importance of your proposal. A table of contents page can be an effective way to help organize your proposal and to orient an examiner.
- HYPOTHESIS AND LONG-TERM OBJECTIVES: A hypothesis-driven proposal is usually better received than a primarily descriptive one. Begin with your stated hypothesis and link it to your long-term objectives. Make these concise and specific. Ask yourself what the proposed research is intended to accomplish and what its significance and relevance are?
- BACKGROUND AND SIGNIFICANCE: This section should include the big picture, what is known, what is not known, and why is it essential to find out. Provide a brief outline of the highlights in the background review, including your own contributions, if applicable. Don't drown them in details! You should ask yourself whether each bit of background information is needed.
- Critically evaluate the relevant literature: this should not be an exhaustive or uncritical list. When a controversy or disagreement exists, discuss fairly all sides. Identify the gaps and contradictions that you will address. Link these into the rationale for your proposal. Emphasize how your proposal bridges the background review and your hypotheses and objectives. State clearly what is novel, and what is merely confirmatory. This section should not exceed half the allotted pages.
- SPECIFIC AIMS: Distinguish these from your hypothesis and objectives. These are the specific projects or studies you will undertake as part of your long-term objectives. Put your specific aims in a logical and sequential order. Indicate the priority you assign to each one.
- RESEARCH DESIGN AND METHODS: The Specific Aims have stated what you propose. Now, you must describe how you propose to achieve them. Consider a brief opening paragraph describing the relationship of the Specific Aim to the Objectives and a one-sentence rationale. Follow this with an outline of the design and methods. Explain why the proposed approach was chosen. Don't repeat descriptions of identical procedures that apply to more than one Specific Aim. Reference, but don't describe well-known or standard procedures. Do describe procedures that are new or unlikely to be known to one or more of the examiners. For a new method, explain why it is better than a more traditional one. Discuss relevant control experiments; this is too often lacking. Explain your data collection and analysis, the expected outcomes and your interpretation. What conclusions do you expect to be able to draw? Be sure to briefly discuss potential difficulties and limitations of the proposed procedures and to provide alternative approaches. This may pre-empt serious criticisms. It is expected that the student will have knowledge of all of the approaches proposed.
- EXPECTED OUTCOMES: Describe the expected outcomes of the proposed research, both in

terms of specific experimental outcomes as well as the more general implications of the proposed research, highlighting its significance and how it will advance knowledge.
- TIMETABLE: Provide a brief tentative sequence and timetable for the project. Although not essential for a candidacy proposal, thinking about timelines can alert you to issues pertaining to feasibility. Your proposal should be feasible by yourself and a laboratory technician in three to five years. Many candidacy proposals include a lifetime of work and are unrealistically ambitious.

How to Write a Great Candidacy Proposal

This proposal is NOT the same thing as your PhD Thesis Proposal. The Candidacy Research Proposal is prepared independently by the student.

The objective of these guidelines is to assist you in preparing an effective candidacy proposal that is clear, focused and a pleasure to read. Good writing doesn't save bad ideas, but bad writing kills good ones.

Long before D-day:

- Consider the time frame you have to work in. **The Candidacy proposal must be submitted to your examining committee two weeks before the date of the exam**. Failure to submit the document on time may lead to postponing the exam.
- Ask your fellow graduate students for past examples of successful candidacy proposals. Reading good proposals will give you ideas on layouts and styles that could work for you.
- Attend a Candidacy Preparation tutorial, or ask the Grad Program Administrator for the slides.
- Start thinking of interesting projects and experiments many months before D-day. Try to find an appropriate balance between the "sure" (experiments that have a high likelihood of success but still provide new information), and the innovative or risky (experiments that may not succeed but have potential to provide significant new insight). Avoid being too cautious and doing 'more of the same'. Design experiments to provide new and important information even if the results don't support your hypothesis. Try to incorporate alternative approaches when possible.
- Show the reader that you are aware the initial approach may not be successful and that you have a back-up plan.
- Discuss your ideas with colleagues. Explaining your ideas will help to clarify and focus them and to identify problems.
- **The candidacy document must be your own creation**, although you should avail yourself of expertise to discuss ideas and obtain specific information.
- **The supervisor must not edit or revise the document, nor should the document be based on your supervisor's grant proposals.**

General Considerations

- Everybody is busy, so make your proposal easy to read, with a pleasant and attractive presentation. A sloppy application is often equated with sloppy science. Examiners that have to struggle with your proposal are likely to be more critical.
- Remember you are accountable to defend anything you include in this document. Figures not made by you should be attributed appropriately. Figure legends should be sufficiently explanatory for the reader to understand what the figure shows. The purpose of the legend is to define parts of the figure, not to extend the text page limit. Keep each legend to a maximum of

5 lines. Make figures large enough to see all the details sufficiently to evaluate when viewed at 100%.

- Organize your proposal with appropriate headings and sub-headings. Use a simple and obvious numerical classification. For example, Specific Aim 1 may be followed by experimental approaches 1.1 and 1.2.
- Each paragraph should begin with a strong lead sentence that is interesting and defines the rest of the paragraph. You should be able to get the sense of a proposal by reading only the lead sentences. The remainder of the paragraph elaborates on the lead sentence. A good lead sentence is more effective than a strong concluding sentence.
- Examiners often do their reading in bits-and-pieces. Organize your proposal with this in mind. It can be rather depressing to see 10 pages of dense text without any visual breaks.
- Use the first person (I will measure the activity ...) and an active voice. Rather than "The enzyme is being inhibited by ATP." use "ATP inhibits the enzyme."
- Be ruthless when editing your document. Eliminate statements that do not convey anything important. Scientific proposals are not literature; don't use flowery language and rambling sentences.
- Do not be solely dependent on your computer's spell checker. "If you can't get the spelling right, how are you expected to get the research right?" Have at least one other person read your proposal for spelling, grammar and logic. When editing your own work, there is a tendency to see what you intended to say, rather than what you actually said.
- Avoid the excessive use of abbreviations, acronyms and jargon, especially ones that the non-expert may not understand. If you do use them, define them upon first use. If your proposal contains many abbreviated terms or acronyms, consider adding a table containing the terms and their definitions
- Assume that you are writing for an examiner in a somewhat related field, rather than for an expert directly in your area. Make it easy to read.

Avoid preparing a fragmented and disjointed proposal. Link all the sections to each other.

<u>The PhD Candidacy Oral Exam</u>

- When the Candidate and examining committee have convened in the exam room the designated Chairperson will ensure that introductions will be made if necessary.

- The Candidate will be asked to leave the room briefly while the supervisor provides the examining committee with an account of the Candidates academic and laboratory performance to date.

- The Chairperson will gather the committee's decision on whether the Candidate's submitted document is of sufficient substance to proceed with the examination. If the committee determines that the document is insufficient, including issues with experimental logic, feasibility, rationale, or lack of sufficient content, the exam is Failed (*see below*) and the student will have three options outlined below. The committee must all agree, or all but one agree, to fail the student.

- Note that 'fundability' of a project or unspecified "grantsmanship" issues are not grounds for rejection.

- If the proposal is deemed defendable then and the PhD Candidacy exam proceeds. Once the document is considered acceptable, subsequent evaluation must be based on the student's performance at the exam and flaws in the document cannot be used retroactively to support a decision of adjourn or fail (*see below*).

- The Candidates supervisor will provide the committee with a description of the Candidates academic and laboratory performance to date. This should include courses taken, grades obtained, awards, scholarships, publications and any other information that is deemed relevant.

- The Chairperson will determine the order in which the committee members will examine the Candidate. Typically, the examination will begin with the most external arms-length committee member and proceed to the supervisory committee members and finally the Candidate's supervisor.

- The Candidate will be called back into the room and will be informed of the order in which examiners will question them.

- The Candidate will give a short presentation (15 – 20 min) highlighting key aspects of the Candidacy proposal.

- Following the presentation, the exam will begin immediately.

- There will be two (2) rounds of examination. In the first round, each examiner will have 20 minutes to question the Candidate. In the second round each examiner will be held to no more than 5 minutes.

- The examining committee will have substantial latitude in the topics that they may question the student on. While much of the discussion is expected to be directed toward the specific subject matter covered in the candidacy document, examiners are free to explore related, relevant aspect of Biochemistry that will aid them in determining whether the Candidate displays a sufficient breadth and depth of knowledge in the thesis topic and related subjects expected of a student in a Doctoral program.

- The Candidate and committee will have the opportunity for a short recess between the two rounds of examination.

- The Candidate will be granted an intermission from the questioning at any time and for any reason if they request it.

- At the end of the second round of questioning the Candidate will be provided the opportunity to make a statement. This is a chance for the Candidate to make any formal statement they wish. The time can be used to elaborate on the answer to a question, provide the answer to a question they may not have thought of earlier, comment on any aspect of the program to date, or the exam process. The Candidate is not required to make any statement but this is an opportunity to do so if they wish.

- The Candidate will then be asked to leave the room while the committee deliberates. The standards used by the examining committee will take into consideration the relationship of the proposed work to the students specific training and background.

- Evaluation of the Candidate should be based upon their performance in all aspects of the examination; presentation, written document, oral defense of the document. **The purpose of the exam is to determine if the Candidate has an adequate knowledge of the discipline and subject matter relevant to the thesis; and displays the ability to pursue and complete original research at an advanced level.**

PhD Candidacy Exam Outcomes

- Outcomes of the exam are Adjourn, Pass, Conditional Pass, or Fail, as per FGPS rules.
- After the exam has been completed, a Report of Completion of Candidacy Examination form must be sent to the FGPS through the Graduate Program Administrator.

Members of the examining committee may vote for one of the following possible outcomes (see also FGPS Manual or the University Calendar): Pass, Conditional Pass, Fail, or Adjourn. A "Pass or Fail" decision requires all but one committee member to vote for it. A Conditional Pass and an Adjournment requires only a majority vote. If a "Pass or Fail" decision lacks the required votes, the Chair initiates a discussion, following which a second poll by will occur. The Chair of the examining committee may make a decision in the case of a "hung" committee or may refer the matter to the FGPS.

When the decision is Conditional Pass or Fail, chairs may refer to the decision process flowchart found on the GPS website.

Adjourned: A majority of examiners must agree to an outcome of Adjourned. The candidacy examination should be adjourned in the event of compelling, extraordinary circumstances such as a sudden medical emergency taking place during the examination or possible offences under the Student Academic Integrity Policy after the examination has started.

Pass: All or all but one of the examiners must agree to an outcome of Pass. If the student passes the candidacy examination, the department should complete the Report of Completion of Candidacy Examination form and submit it to GPS.

Conditional Pass: A Conditional Pass is appropriate when the student has satisfied the committee in all but a very discrete area of deficiency that can addressed through a reasonable requirement (e.g., coursework, literature review, upgrading of writing skills). Reworking of the entire candidacy proposal is not an acceptable condition and the examiners should consider the options available for a student that has failed the examination.

A majority of examiners must agree to an outcome of Conditional Pass. If the candidacy examining committee agrees to a conditional pass for the student, the chair of the examining committee will provide in writing within five working days to the Dean, GPS, the Director of Graduate Studies and the student:

- the reasons for this recommendation,
- the details of the conditions,
- the timeframe for the student to meet the conditions, but which should be no less than six weeks and no more than six months.

- the approval mechanism for meeting the conditions (e.g., approval of the committee chair or supervisor, or approval of the entire committee, or select members of the committee), and the supervision and assistance the student can expect to receive from committee members

Conditions are subject to final approval by the Dean, GPS. At the deadline specified for meeting the conditions, two outcomes are possible:

- All the conditions have been met. In this case, the department will complete the Report of Completion of Candidacy Examination form and submit it to GPS; or
- If the conditions are not met by the deadline, the outcome of the examination is a fail and the committee must be reconvened to make the recommendation as described in the following section.

Fail: All or all but one of the examiners must agree to an outcome of Fail.

The options available to the examining committee when the outcome of a student's candidacy exam is "Fail" are

- **Repeat the Candidacy:** Repeating the Candidacy is not an option after a second failed examination. A majority of examiners must agree to an outcome of Fail and Repeat the Candidacy. If the student's first candidacy exam performance was inadequate but the student's performance and work completed to date indicate that the student has the potential to perform at the doctoral level, the examining committee should consider the possibility of recommending that the student be given an opportunity to repeat the candidacy exam. Normally, the composition of the examining committee does not change for the repeat candidacy exam. If the recommendation of a repeat candidacy is formulated by the examining committee and approved by GPS, the student and Director of Graduate Studies are to be notified in writing of the student's exam deficiencies by the chair of the examining committee. The second candidacy exam is to be scheduled no later than six months from the date of the first candidacy. In the event that the student fails the second candidacy, the examining committee shall recommend one of the following two options to the department:
- **Change of Category to a Master's Program:** All or all but one of the examiners must agree to an outcome of Fail and Change of Category to a Master's Program. This outcome should be considered if the student's candidacy examination performance was inadequate and the student's performance and work completed to date indicates that the student has the potential to complete a master's, but not a doctoral, program; or
- **Termination of the Doctoral Program:** All or all but one of the examiners must agree to an outcome of Fail and Terminate the Doctoral Program. If the student's performance was inadequate, and the work completed during the program is considered inadequate, then the examining committee should recommend termination of the student's program.

If the candidacy examining committee agrees that the student has failed, the committee chair will provide the reasons and the recommendation for the student's program to the department. The Director of Graduate Studies will then provide this report, together with the department's recommendation for the student's program, to the Dean, GPS, and to the student.

For failed candidacy examinations, an Associate Dean, GPS, normally arranges to meet with the student (and others as required) before acting upon any department recommendation.

Section 9: Master's Final Examination

Thesis Seminar
All students are required to present a seminar on their theses prior to defending. Anyone is welcome to attend the seminar. Seminars are scheduled for one hour and will precede the defense on the same day.

Examining Committee Composition
Before nominating the supervisor or examining committee, ensure that eligibility criteria, conflict of interest, and teleconferencing guidelines have been met.

Minimum four faculty member examiners:

- Supervisor
- Two supervisory committee members
- One university examiner (from any department)
- Must be chaired by a faculty member from inside the department (assigned by the Grad Program Administrator)
- All members must attend the examination, which includes members participating through teleconferencing (see "Attendance at Examinations").

It is the responsibility of the supervisor to ensure that:

- proper arrangements are made for the candidate's examination
- the exam is scheduled and held in accordance with GPS regulations
- the candidate is not required to make these arrangements

In the absence of the supervisor, these responsibilities shall be carried out by the Director of Graduate Studies or designate. It is the responsibility of the department to keep committee members informed of meetings of the committee and details of examinations.

Time Lines and Approval of the Final Oral Examining Committee
At least three weeks prior to the final oral examination, it is the responsibility of the department to:

- recommend names of all members of the final oral examining committee and forward them to the GPS for approval on a Notice of Examining Committee & Examination Date (Master's Final) form.
- notify the examiners of the examination date
- supply examiners with a copy of the thesis so that they may have adequate time to appraise the thesis

Changing a Final Examining Committee
The department recommends revisions to the final examining committee by completing a Notice of Examining Committee & Examination Date (Master's Final) form and submitting it to the GPS.

Master's Examination
The committee will review the thesis and conduct an oral examination designed to test the candidate's knowledge of the thesis subject and of related fields. The language used to conduct the final oral examination shall be English. However, the committee may petition the Dean, GPS, and on receiving written approval, may conduct the examination in a language other than English.

Attendance at a Master's examination
Except for the Dean, GPS (or Associate Dean or pro dean), who may participate fully in the examination, persons other than the examiners may attend only with the approval of the Dean, GPS, or the chair of the committee. Visitors may not participate in the committee's discussion concerning its decision on the student's performance and must withdraw before such discussion commences.

Decision of the Master's Final Examination Committee
The decision of the examining committee will be based both on the content of the thesis and on the candidate's ability to defend it.

Normally, if all but one member of the committee agrees on a decision, the decision shall be that of the majority. The dissenting committee member does not have to sign the thesis.

If two or more dissenting votes are recorded, the department will refer the matter to the Associate Dean, GPS, who will determine an appropriate course of action.

One of the following outcomes of the final oral examination is appropriate:

- Pass
- Pass subject to revisions
- Adjourned
- Fail

There is no provision for a final oral examination to be "passed subject to major revisions".

Pass: The only revisions required are typographical or editorial changes. If the student passes the examination, the chair shall complete a report and the department shall complete Thesis Approval/Program Completion (TAPC) form and submit both to GPS.

Pass subject to revisions: The student has satisfactorily defended the thesis but the revisions needed will require substantial time to correct, although the revisions are not so grave that the examining committee will need to reconvene.

The chair shall complete a report indicating "pass subject to revisions" and submit it to the department who will then forward to GPS within 5 days of the exam. The Thesis Approval/Program Completion (TAPC) form can be signed by all of the examining committee members except for the supervisor or chair. The final signatures will be withheld until the revisions have been satisfactorily completed.

The student has 6 months to satisfactorily complete the revisions.

These changes should be checked and approved by the committee chair or supervisor, who does not sign the thesis until the required changes are satisfactorily completed. Other committee members may also wish to withhold their signature until they can verify that their required revisions have been made to their satisfaction.

Once the changes have been approved, the TAPC form is to be signed by all remaining members and submitted to GPS (via the department).

Adjourned: The final oral examination should be adjourned in the following situations:

- The revisions to the thesis are sufficiently substantial (if further research or experimentation or major reworking of sections are required, or if the committee is not satisfied with the general presentation of the thesis) that it will require a reconvening of the examining committee. The committee should not propose that the candidate has passed rather the committee shall adjourn the examination.
- The committee is dissatisfied with the candidate's oral presentation and defence of the thesis, even if the thesis itself is acceptable with or without minor revisions.
- Compelling, extraordinary circumstances such as a sudden medical emergency during the examination.
- Discovery of possible Code of Student Behavior offences

If the examination is adjourned, the committee should:

- Specify in writing to the student, with as much precision as possible, the nature of the deficiencies and, in the case of revisions to the thesis, the extent of the revisions required. Where the oral defence is unsatisfactory, it may be necessary to arrange some discussion periods with the candidate prior to reconvening the examination.
- Decide upon a date to reconvene. If the date of the reconvened oral examination depends upon the completion of a research task or a series of discussions, it should be made clear which committee members will decide on the appropriate date to reconvene. The final date set for reconvening shall be no later than six months from the date of the examination.
- A final decision of the examining committee must be made within six months of the initial examination.
- Make it clear to the student what will be required by way of approval before the examination is reconvened (eg, approval of the committee chair or supervisor, approval of the entire committee, or of select members of the committee).
- Specify the supervision and assistance the student may expect from the committee members in meeting the necessary revisions.
- Advise GPS in writing of the adjournment and the conditions.
- When the date is set for the adjourned final oral examination, the department will notify GPS. Normally the Dean, Associate Dean or Pro Dean attends the examination.

Fail: If the final examination committee agrees that the student has failed, the committee chair shall provide the reasons for this recommendation and the department's recommendation for the student's program in writing to the Associate Dean, GPS and to the student.

The Associate Dean, GPS will arrange to meet with the candidate and with department representatives before acting upon any department recommendation. A decision by GPS which affects a student's academic standing (ie, required to withdraw) is appealable.

Section 10: Final Doctoral Examination

Preliminary Acceptance of the Thesis

Before the thesis is forwarded to the external examiner, PhD supervisory committee members shall declare in writing to the supervisor either that the thesis is of adequate substance (and quality) to warrant that the student proceed to the final examination or that the thesis is unsatisfactory and the student should not be allowed to proceed to the final oral examination. A preliminary acceptance form

can be found on the Biochemistry website, or from the Grad Program Administrator.

The purpose of this process is to ensure the thesis is vetted by the supervisor and all supervisory committee members and to verify that it is of sufficient substance and quality to proceed to the defense.

This process is critical to protect and uphold the reputation of the department and the University of Alberta for excellence in graduate programs. It is also critical to ensure that External Examiners and other additional members of the examining committee are not asked to invest time reading a thesis that is substandard.

The department must obtain this "Preliminary Acceptance of Thesis" signature sheet before the thesis is sent to the external examiner. This must happen a minimum of 4 weeks prior to the defense date.

Inviting the External Examiner

It is the responsibility of the Graduate Chair to nominate an external examiner and to submit the name to the Faculty of Medicine and Dentistry (FoMD) for approval. This should be done on an *"Approve External Examiner for Final Doctoral Oral Exam*" form prepared by the supervisor. A "*Conflict of Interest Checklist*" completed by the supervisor and the student should accompany the form. Normally, these documents, along with the external examiners CV, should be submitted to the department **at least two months** in advance of the examination date.

The submission must include a brief CV of the external examiner and a short statement regarding the external's qualifications. GPS is particularly interested in the external examiner's current scholarly publications and research activities and experience with graduate student education. The CV must include a training portfolio - which includes the following:

- Graduate Student's Name
- Graduate Student's Degree (MSc, PhD)
- Relationship with the graduate student (e.g. Supervisor, Master Supervisory Committee Member, PhD candidacy exam committee member, etc.)

The external shall be a recognized authority in the special field of research of the candidate's thesis, and will be an experienced supervisor of doctoral students. The proposed external examiner must be in a position to review the thesis objectively and to provide a critical analysis of the work and the presentation. It is therefore essential that the external examiner not have a current or previous association with the student, the supervisor, or the department that would hinder this type of objective analysis. For example, a proposed examiner who has recently been associated with the student as a research collaborator or co-author would not be eligible. Also, a proposed external examiner must not have had recent association with the doctoral candidate's supervisor (as a former student, supervisor, or close collaborator, for instance). Supervisors who are in doubt about the eligibility of a potential external examiner should call the Associate Dean, Research (FoMD), to review the case before approaching the external.

Under normal circumstances the same person will not be used as an external examiner at the University of Alberta if that examiner has served in the same capacity at this University within the preceding two years. GPS interprets this to mean **the same external examiner cannot be used in the same department within two years**; this does not preclude an examiner serving in another department.

Once the external has been approved by the FoMD and GPS, the Graduate Chair will officially invite the external.

The external shall receive the thesis at least four weeks before the final

The external should not be contacting the supervisor directly regarding the thesis or making arrangements related to the examination. Please use the assistance of the Grad Program Administrator for coordination purposes.

Travel Funds for External Examiners
It is the responsibility of the supervisor to pay for the external examiners travel. The Dean, GPS, has limited funding available for external examiners that supervisors can request. Complete the form found on the GPS website. In addition, supervisors can apply for a Walter MacKenzie Visiting Speaker Fund through the FoMD.

Final Doctoral Examining Committee Composition
Before nominating the final doctoral examining committee, ensure that eligibility criteria, conflict of interest, and teleconferencing guidelines have been met.

Minimum five examiners:

- The supervisory committee
- One member must be an external examiner from outside the University
- In addition to the external, the committee must have a minimum of one additional arm's length member who comes new to the examination (but may have served on the candidacy examining committee). GPS encourages departments to nominate for this function a University staff member who comes to the finished thesis having read none of its earlier drafts. In this way the student benefits from an outside perspective without any of the possible biases of the supervisor and supervisory committee members.
- Must be chaired by a faculty member who is not the supervisor (or co-supervisor) but is a member of the student's home department. The chair does not vote.
- Must have a minimum of five members in attendance at the examination, which includes members participating through teleconferencing (see “Attendance at Examinations”).
- Roles of members (except the chair) can be in almost any combination. Examples: co-supervisors; a co-supervisor from outside the department; supervisor from outside the department; arm's length member from inside or outside the department, etc.

Approval of the Final Doctoral Examining Committee
The department will recommend names of all members of the final oral examining committee and forward them to GPS for approval on a “Notice of Examining Committee & Examination Date (Doctoral Final Oral Exam)” form. **This form must be submitted to the GPS at least three weeks before the date of the final oral examination**.

Changing a Doctoral Final Oral Examining Committee
The department recommends revisions to the final examining committee by completing a Notice and Approval of Doctoral Final Oral Examining Committee form and submitting it to GPS.

When an External Examiner Attends the Oral Examination

If the department and supervisor have the resources to bring an external to the campus for the examination, GPS encourages them to do so. In these cases, departments should indicate on the "Notice of Examining Committee & Examination Date (Doctoral Final Oral Exam)" form that the external will be in attendance in person or virtually. Once the external examiner is approved by the Associate Dean, FOMD, a letter of invitation will be mailed to the external by the department.

The external examiner will also be asked to make travel arrangements in consultation with the department. All travel expenses involved are the responsibility of the department.

Report of the External Examiner

In the letter of invitation sent to the attending external examiner by the Director of Graduate Studies, the external is requested to prepare and send to them, at least one week in advance of the examination, a brief written commentary (approximately two to three pages) on

- the structure, methodology, quality, significance and findings of the thesis for the reference of both the candidate and supervisor.
- asking that the thesis be temporarily placed in one of the following categories:
    - the thesis is acceptable with minor or no revisions;
    - the external wishes to reserve judgment until after the examination; or
    - the thesis is unacceptable without major revisions.
        - If the thesis is judged by the external to fall into the last category, the external is asked to contact the Associate Dean, GPS immediately, since the final examination may have to be postponed.
- a list of clear, direct, contextualized questions (preferably no more than five) for the candidate to address during the examination, **if the external examiner is unable to attend the exam**,
- a list of minor corrections (if any).

The commentary should not be given to the student prior to the examination. The report will be shared with the student and the supervisor upon completion of the oral exam. If the external examiner is unable to attend the exam, the chair of the examining committee will present the external's report and questions to the student for the first time during the examination and the committee will evaluate the student's answers as part of the examination.

Establishing Doctoral Examination Procedures

Each department offering a doctoral degree is required to establish detailed examination procedures for final oral examinations. These procedures are made available to faculty members and students in the department and to the Dean, GPS.

The examining committee shall conduct a final oral examination, based largely on the thesis. It is the responsibility of the supervisor to ensure that:

- proper arrangements are made for the candidate's examination
- the examination is scheduled and held in accordance with GPS regulations
- the candidate is not required to make these arrangements

In the absence of the supervisor, these responsibilities shall be borne by the departmental Director of Graduate Studies or designate.

The department must notify the examining committee members of the examination date and should

supply them with a copy of the thesis at least three weeks in advance (four weeks for the external), so that they may have adequate time to appraise the thesis.

The language used to conduct the examination shall be English. However, the committee may petition the Dean, GPS, and on receiving written approval, may conduct the examination in a language other than English.

The following guidelines are followed:

- The thesis exam will normally be preceded by the Candidate providing a public seminar of 45 minutes in length describing the research program. At the conclusion of the seminar the candidate will take questions but the **members of the examining committee will refrain from asking questions until they participate in the formal examination**.
- Following the completion of the seminar the Candidate and committee will retire to a prearranged examination room. The Candidate should have available a copy of the thesis and any reference materials they require. It is recommended that the candidate have water or other refreshment that they may require for the exam, which may last up to three hours. **Candidates should never play host or hostess, serving tea, etc.**
- When the Candidate and examining committee have convened in the exam room the designated Chairperson will ensure that introductions are made if necessary.
- The Candidate will be asked to leave the room while the committee has a brief discussion.
- The Chairperson will confirm the committee's decision on whether the Candidate's submitted document is of sufficient substance to proceed with the examination.
- The Candidates supervisor will provide the committee with a description of the Candidates academic and laboratory performance to date. This should include courses taken, grades obtained, awards, scholarships, publications and any other information that is deemed relevant to the performance of a Doctoral Candidate.
- The Chairperson will determine the order in which the committee members will examine the Candidate. Typically, the examination will begin with the most external arms-length committee member and proceed to the supervisory committee members and finally the Candidate's supervisor.
- The Candidate will be called back into the room and will be informed of the order in which examiners will question them.
- There will be two (2) rounds of examination. In the first round, each examiner will have 20 minutes to question the Candidate. In the second round each examiner will be held to no more than 5 minutes.
    - It is generally agreed that the most time should be allotted to the internal/external member and the external examiner (if present) and the least to the supervisor. In this way new and challenging questions are asked in place of reiteration of questioning already utilized to develop the candidate and enhance the research. Examiners should avoid arguing among themselves and excluding the candidate. They should not lecture but should ask detailed questions about the thesis and occasional broad, disciplinary questions, testing for evidence of education, not just training. Typographical and stylistic errors should not take up examination time.
- The examining committee will have substantial latitude in the topics that they may question the student on. While much of the discussion is expected to be directed toward the specific subject matter covered in the thesis document, examiners are free to explore related areas or any relevant aspect of Biochemistry that will aid them in determining whether the Candidate

displays a sufficient breadth and depth of knowledge in the thesis topic to warrant being awarded the degree of PhD in Biochemistry.

- The Candidate and committee will have the opportunity for a short recess between the two rounds of examination.
- The Candidate will be granted an intermission from the questioning at any time and for any reason if they request it.
- At the end of the second round of questioning the Candidate will be provided the opportunity to make a statement. This is an opportunity for the Candidate to make any formal statement they wish. The time can be used to elaborate on the answer to a question, provide the answer to a question they may not have thought of earlier, comment on any aspect of the program to date, or the exam process. The Candidate is not required to make any statement but this is an opportunity to do so if they wish.
- The Candidate will then be asked to leave the room while the committee deliberates. The committee discussion may be very brief or may take longer. The outcome is not related to the length of the discussion.
- When the committee has reached a conclusion, the Candidate will be called back into the room and informed of the committee's decision. Details of the possible examination outcomes and their implications for the Candidate are contained in the Biochemistry Graduate Program Manual.

Responsibilities of the Chair

The final oral examination shall be chaired by a faculty member who is not the supervisor but is a member of the student's home department. Each department shall establish a mechanism by which individuals are assigned this responsibility. The chair is responsible for moderating the discussion and directing questions and may participate in the questioning. The chair does not vote or sign the thesis. It is the chair's responsibility to ensure that departmental and GPS regulations relating to the final oral examination are followed.

Attendance at Doctoral Examinations

Faculty members of the student's major department as well as members of GPS Council (or their alternates) have the right to attend doctoral examinations but should notify the chair of the examining committee. Other persons may attend the defense only with special permission of the Dean, GPS, or the chair of the examining committee. Except for the Dean, GPS, (or Associate Dean or pro dean) who may participate fully in the examination, persons who are not members of the examining committee: (a) may participate in the questioning only by permission of the chair of the committee; (b) are not permitted to participate in the discussion of the student's performance and must withdraw before such discussion commences (see "Attendance at Examinations" and "Attendance of Pro Dean at Examinations").

Decision of the Final Doctoral Examining Committee

The decision of the examining committee will be based both on the content of the thesis and on the candidate's ability to defend it. Normally, if all but one member of the committee agrees on a decision, the decision shall be that of the majority, except when the one dissenting vote is that of the external examiner. If this happens, it must be reported to the Associate Dean, GPS, who will determine an appropriate course of action. If two or more dissenting votes are recorded, the department will refer the matter to the Associate Dean, GPS, who will determine an appropriate course of action.

One of the following outcomes of the final oral examination is appropriate:

- Pass
- Pass subject to revisions
- Adjourned
- Fail

There is no provision for a final oral examination to be "passed subject to major revisions".

Pass: The only revisions required are typographical or editorial changes. If the student passes the examination, the chair shall complete a report and the department shall complete Thesis Approval/Program Completion (TAPC) form and submit both to GPS.

Pass subject to revisions: The student has satisfactorily defended the thesis but the revisions needed will require substantial time to correct, although the revisions are not so grave that the examining committee will need to reconvene.

The chair shall complete a report indicating "pass subject to revisions" and submit it to the department who will then forward to GPS within 5 days of the exam. The Thesis Approval/Program Completion (TAPC) form can be signed by all of the examining committee members except for the supervisor or chair. The final signatures will be withheld until the revisions have been satisfactorily completed.

The student has 6 months to satisfactorily complete the revisions.

These changes should be checked and approved by the committee chair or supervisor, who does not sign the thesis until the required changes are satisfactorily completed. Other committee members may also wish to withhold their signature until they can verify that their required revisions have been made to their satisfaction.

Once the changes have been approved, the TAPC form is to be signed by all remaining members and submitted to GPS (via the department).

Adjourned: The final oral examination should be adjourned in the following situations:

- The revisions to the thesis are sufficiently substantial (if further research or experimentation or major reworking of sections are required, or if the committee is not satisfied with the general presentation of the thesis) that it will require a reconvening of the examining committee. The committee should not propose that the candidate has passed rather the committee shall adjourn the examination.
- The committee is dissatisfied with the candidate's oral presentation and defence of the thesis, even if the thesis itself is acceptable with or without minor revisions.
- Compelling, extraordinary circumstances such as a sudden medical emergency during the examination.
- Discovery of possible Code of Student Behavior offences

If the examination is adjourned, the committee should:

- Specify in writing to the student, with as much precision as possible, the nature of the deficiencies and, in the case of revisions to the thesis, the extent of the revisions required. Where the oral defence is unsatisfactory, it may be necessary to arrange some discussion periods with the candidate prior to reconvening the examination.

- Decide upon a date to reconvene. If the date of the reconvened oral examination depends upon the completion of a research task or a series of discussions, it should be made clear which committee members will decide on the appropriate date to reconvene. **The final date set for reconvening shall be no later than six months from the date of the examination.**
- A final decision of the examining committee must be made within six months of the initial examination.
- Make it clear to the student what will be required by way of approval before the examination is reconvened (eg, approval of the committee chair or supervisor, approval of the entire committee, or of select members of the committee).
- Specify the supervision and assistance the student may expect from the committee members in meeting the necessary revisions.
- Advise GPS in writing of the adjournment and the conditions.
- When the date is set for the adjourned final oral examination, the department will notify GPS. Normally the Dean, Associate Dean or Pro Dean attends the examination.

Fail: If the final examination committee agrees that the student has failed, the committee chair shall provide the reasons for this recommendation and the department's recommendation for the student's program in writing to the Associate Dean, GPS and to the student.

The Associate Dean, GPS will arrange to meet with the candidate and with department representatives before acting upon any department recommendation. A decision by GPS which affects a student's academic standing (ie, required to withdraw) is appealable.

Time Limit for Submission of Doctoral Theses to GPS

Following completion of the final oral examination at which the thesis is passed or passed subject to revisions, the candidate shall make the appropriate revisions where necessary and submit the approved thesis to the GPS within six months of the date of the final oral examination. Departments may impose earlier deadlines for submitting revisions.

If the thesis is not submitted to the GPS within the six-month time limit, the candidate will be considered to have withdrawn from the program. After this time, the candidate must apply and be re-admitted to the GPS and register again before the thesis can be accepted.

If the final oral examination is adjourned, the six-month time limit will take effect from the date of completion of the examination where the thesis was passed with or without revisions.

Section 11: Completing Your Program

Once you have successfully defended your thesis, follow the checklist provided by GPS to complete your program: format and upload your thesis and apply for graduation. https://www.ualberta.ca/graduate-studies/current-students/academic-requirements/thesis-requirement-and-preparation/index.html

After your thesis has been accepted by the university, submit the final document to the Grad Program Administrator. A hard copy of your thesis will be printed for the department, you will have the option to print further copies at the lab/individual's expense.

Appendix A: Professional Development Record of Activities

UNIVERSITY OF ALBERTA
FACULTY OF GRADUATE
STUDIES & RESEARCH

PROFESSIONAL
DEVELOPMENT

Professional Development Record of Activities

This record may be given to your Department/Faculty or kept for personal purposes.

Description of Professional Development Activity	Date Completed	Time (hours)
	Total Hours	

Note: A minimum of eight hours of training in professional development is required.

I make this statement conscientiously, believing it to be true and knowing that it is of the same force and effect as if under oath and that misrepresentation of facts may be found to be a violation of the Code of Student Behaviour and be sanctioned accordingly.

Student Signature **Date**

June 6, 2016

Appendix B: Preliminary Acceptance of Thesis

PRELIMINARY ACCEPTANCE OF THESIS

Student's Name: _____

As stated in the FGSR's Graduate Program Manual, preliminary acceptance of the thesis by the PhD Supervisory Committee is required before the thesis can be sent to the External Examiner. This form must be completed by the student's Supervisory Committee (and given to the Department's graduate office) before the Notice and Approval of Oral Examination Committee form will be sent to the FGSR.

The Grad Office must receive this signed form before the thesis will be sent to the the external examiner

"I have read the thesis and I verify that it is of sufficient substance and quality to proceed to the final oral examination and defence."

Name of supervisory committee member	Signature Date
Name of supervisory committee member	Signature Date
Name of supervisory committee member or Supervisor	Signature Date
Name of Supervisor	Signature Date