

GRADUATE STUDENT HANDBOOK

Department of Chemical & Biological Engineering

College of Engineering

University of Idaho



Graduate degrees offered:

Master of Science (thesis) in Chemical Engineering
Master of Engineering (non-thesis) in Chemical Engineering
Doctor of Philosophy (Ph.D.) in Chemical Engineering

Master of Science (thesis) in Biological Engineering
Master of Engineering (non-thesis) in Biological Engineering
Doctor of Philosophy (Ph.D.) in Biological Engineering

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This handbook supplements general information in the current University of Idaho Catalog.

A summary of the University requirements for graduate degrees can be found at

<http://www.uidaho.edu/catalog>.



Foreword

This handbook provides requisite information from admission to graduation for graduate students in the Department of Chemical and Biological Engineering (ChBE) at the University of Idaho (UI). The information presented herein includes relevant information from the ChBE department bylaws, College of Graduate Studies (COGS) website and the current UI General Catalog. You are encouraged to confirm information from the above sources.

For the COGS and General Catalog websites:

<http://www.uidaho.edu/cogs>

<http://www.uidaho.edu/registrar/classes/catalogs>

We at the Department would like to provide you with as much information as possible for you to be successful in your pursuit of a graduate degree. The Department offers two programs: Chemical Engineering (ChE) and Biological Engineering (BE). Please contact the Department Administrative Assistants or Graduate Coordinator if you do not find the answer to your question in this handbook or elsewhere:

Department Administrative Assistants:

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Website: <https://www.uidaho.edu/engr/departments/chbe/degrees>

Thank you for your interest in our graduate programs. We are here to help you. Please reach out to us if you have any questions. Good luck!

ChBE Department, University of Idaho

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I. Introduction

The graduate student population is culturally diverse, conducting research in Moscow and Idaho Falls campuses. Research-active faculty members are equally diverse and may have several students working on projects with them. A significant fraction of these students earn more than one degree from UI and/or from Chemical Engineering (ChE) and Biological Engineering (BE) programs, which include continuing, returning, and dual-enrolled students. Some BS students who conduct research projects with a professor choose to expand their expertise in that same subdiscipline and have a funding opportunity to work toward Master of Science (M.S.) or Doctor of Philosophy (Ph.D.) degrees with the same professor or other faculty in our department. In some cases, this can lead to a shorter time to earn an M.S. or a Ph.D., when the preceding degree and project required similar skills and specialized coursework.

The College of Graduate Studies (COGS) at the University of Idaho supports the administrative portion of admission and graduation of graduate students, and their website and personnel should be your first points of contact for all general questions (not discipline specific) about your graduate studies at UI, including required training and orientation sessions and professional development opportunities: <http://www.uidaho.edu/cogs/pdi>.

II. Program Overview

The Department of Chemical and Biological Engineering (ChBE) at the University of Idaho (UI) offers graduate degree programs leading to the Master of Science (M.S.), Master of Engineering (M. Engr.), and Doctor of Philosophy (Ph.D.) in ChE or BE. As offered by this department, the M.S. and Ph.D. are research degrees with thesis and dissertation requirements. The M. Engr. is a non-thesis degree.

Graduate students are encouraged to participate in the larger student body groups both inside and outside of our department, some of which are mentioned later. Our degrees are naturally interdisciplinary and highly collaborative in the world of science and engineering. Every faculty member is unique and has their own style of managing and supervising research for individuals and teams of students; the selection of a project, advisor, and group of fellow researchers in one's group is simultaneously interesting, and complex. Every new student who has not yet selected a research advisor and project should feel free to engage students, staff, and faculty about their experiences and recommendations for the decision-making process in what will be a very formative and invaluable adventure in graduate school life.

We require all graduate students to attend the open presentations of other students who are further along in their degree programs, to learn from them directly and to support them as part of a growing and changing team. Seminars, defenses, qualifying exams and preliminary exam presentations are sometimes integrated into the requirements for our core CHE 501 or BE 501 Seminar series, and students are also encouraged to seek out other seminars on campus and attend those for a broader perspective.

III. Admission Requirements

The College of Graduate Studies (COGS) at the University of Idaho supports the administrative portion of admission and graduation of graduate students, while the department actively engages in recommending admission, financial support, developing graduate courses and curricula, and providing mentorship/advice for degree completion. The COGS sets up admission and graduation rules. Generally, admission as a graduate student is open to any student who holds a baccalaureate degree (e.g., BS) in a closely related field and who presents a scholastic record indicating future success is probable in graduate work.

The details of the admission requirement is provided in COGS website. The following links are provided for your convenience:

ChE (M. Engr., M.S., Ph.D.)

<https://www.uidaho.edu/admissions/graduate/graduate-programs/chemical-engineering>

BE (M. Engr., M.S., Ph.D.)

<https://www.uidaho.edu/admissions/graduate/graduate-programs/biological-engineering>

For more information, please refer to the following link on graduate admission requirements and to apply: <https://www.uidaho.edu/admissions/graduate>. Check on application deadlines. In order to make sure your application is reviewed, and a decision is reached in a timely manner, please follow those dates currently posted: <http://www.uidaho.edu/cogs/deadlines>

IV. ChE Degree Requirements

The general procedures for students pursuing Master's degrees at the University of Idaho (30 credits requirement) are contained in the University Catalog and COGS website. Each student is responsible to read and understand the general regulations.

In-house undergraduate students, if interested to pursue graduate studies at the University of Idaho, are encouraged to think about taking some graduate courses in their final year, which must be formally "reserved" for their graduate transcript before graduating with their BS degree if they wish to count those credits toward future graduate degree. Reserved credits may not be counted toward the BS degree requirements.

A. Accelerated 4+1 Masters of Engineering (M. Engr.) Program in ChE

Accelerated 4+1 Masters of Engineering Program allows current ChE undergraduate students at University of Idaho to receive Masters of Engineering in one additional year while paying in-state undergraduate fee. In order to take advantage of this program, students must apply before completing an undergraduate degree by the deadline specified on the COGS website. If the student has over the minimum number of credits for the UG degree and want to use (under criteria 'g' below) credits for the graduate transcript they must [submit credit reservation form](#) and approved by COGS before the end of the term in which the UG degree is awarded. Normally, 4+1 M.E. degree will meet each of the following criteria.

Criteria

- a ChE 515: Transport Phenomena ≥ 3 credits
 - b ChE 529: Chemical Engr. Kinetics ≥ 3 credits
 - c ChE 541: Chemical Engr. Analysis I ≥ 3 credits
 - d ChE 501 or BE 501 Seminar ≥ 2 credits
 - e ChE 599: Non-Thesis Research (≥ 1 and ≤ 5 credits)
 - f Undergraduate credits (400+ and B+ grade) used for graduation = 6 Credits
 - g Undergraduate credits (400+ and B+) not used for graduation in other Engineering, Math/Stat, or Science ≥ 6 credits. Count only 6 credits toward degree
 - h 500+ credits ≥ 18
 - i Total credits ≥ 30
-

400+ means 400 or 500 level classes; B+ means B or better grade

B. Leading to M.S. ChE Degree for Students Having a BS ChE or Similarly Named Degree

The requirements specified in COGS website supersedes departmental requirement (see Degree Requirements link in appendix D) in case of conflict. The requirements for the M.S. program are:

Criteria

- a ChE 500: Master's Research ≥ 10 credits. Count only 10 credits toward degree
 - b CHE 501 or BE 501 (Seminar) ≥ 2 credits
 - c ChE 515: Transport Phenomena ≥ 3 credits
 - d ChE 529: Chemical Engr. Kinetics ≥ 3 credits
 - e ChE 541: Chemical Engr. Analysis I ≥ 3 credits
 - f ChE 5xx Elective, not counting (a-e,598-599) ≥ 3 credits
 - g Other supporting courses (300+) ≤ 6 credits
 - h Total credits ≥ 30
-

For Idaho Falls students, the seminar (ChE 501) can be replaced by other ChE or BE or other closely related courses approved by advisor and program coordinator. Students may need to work beyond the minimum 30 credits to complete the required coursework successfully.

A M.S. thesis student should have a committee with a minimum of three faculty members with the major professor as the chair of such committee. While an out-of-department committee member is not a requirement, no more than one outside member may be included in the thesis

committee. The M.S. (thesis) student must defend her/his thesis before the committee and the public during the last semester of attendance.

C. Leading to M.S. ChE Degree for Students Having Degrees Other than BS ChE.

The policies of the ChE program are:

1. The following “deficiency” courses, or equivalent through other course work or experience, should be taken to complete the M.S. degree program:

Chem 111-112 Principles of Chemistry I & II

Physics 211-212 Engr. Physics I & II

Engr 335 Fluid Mechanics

ChE 223 Material & Energy Balances

Math 310 Ordinary Differential Equations

Chem 305 Physical Chemistry **-or-** Engr 320: Engr. Thermo & Heat Transfer

ChE 326 ChE Thermodynamics

ChE 330 Separation Processes

ChE 340 Transport & Rate Processes I

ChE 341 Transport & Rate Processes II

2. Recommended, but not required courses are:

ChE 423 Reactor Kinetics and Design

ChE 444 Process Analysis & Control

ChE 453 Process Analysis and Design I

3. General requirements for the M.S. program are the same as “Leading to M.S. ChE Degree for Students Having a BS ChE or Similarly Named Degree” above. Other supporting courses under criteria ‘g: Other supporting courses (300+) \leq 6 credits’, may include deficiency course.

D. Idaho Falls Program Leading to M.S. ChE for Students Having Degrees Other than BS ChE

The policies of the ChE Program are:

1. The following “deficiency” courses, or equivalent course work should be taken to complete to the M.S. degree program.

Chem 111-112 Principles of Chemistry I & II

Physics 211-212 Engr. Physics I & II

Engr 335	Fluid Mechanics
ChE 223	Material & Energy Balances
Math 310	Ordinary Differential Equations
Chem 305	Physical Chemistry -or- Engr 320: Engr. Thermo & Heat Transfer
ChE 326	ChE Thermodynamics

- The general requirements for the M.S. program are the same as “Leading to M.S. ChE Degree for Students Having a BS ChE or Similarly Named Degree” above. Other supporting courses under criteria ‘g: Other supporting courses (300+) \leq 6 credits’, may include deficiency course.
- All regulations in the University of Idaho Graduate Bulletin must be satisfied. See especially the General Requirements.

E. Leading to Master of Engineering (M. Engr.) in ChE

The Master of Engineering is a coursework-based degree and hence the final examination is not comparable to a thesis defense. However, it is designed to show that the student has mastered additional skills in the field of study and critical thinking.

The requirements specified in COGS website supersedes departmental requirement (see Degree Requirements link in appendix D) in case of conflict. The requirements for the M.E. program are:

Criteria

- ChE 515: Transport Phenomena \geq 3 credits
 - ChE 529: Chemical Engr. Kinetics \geq 3 credits
 - ChE 541: Chemical Engr. Analysis I \geq 3 credits
 - ChE 501 or BE 501 Seminar \geq 2 credits
 - ChE 599: Non-Thesis Research (\geq 1 and \leq 5 credits)
 - Undergraduate courses (400+) not taken to cover deficiency \leq 12 credits.
 - 500+ credits \geq 18
 - Total credits \geq 30
-

1. Master of Engineering Final Exam – Report and Presentation

The exam is in two parts: a written review and an oral presentation. The student will be given a list of papers to review critically. They will then choose one of the papers and write a review of the paper and submit this to the examination committee. Optionally, if student already has a published journal paper, they can present it. This committee will be selected by either the

Department Chair or the Chemical and Biological Engineering coordinator in Idaho Falls. The committee will consist of two or more faculty or affiliate faculty. The written presentation should consist of an introduction stressing significance and summarizing related work including discussion, critique, and suggestions for extension of the work. The committee will evaluate the review, indicating approval or disapproval to the student. If the review is approved, the oral examination will then be scheduled. The oral exam will consist of a presentation of the written review. At the conclusion of the presentation, committee members may question the student on the review or any other topics relating to the student's graduate studies. At the end of the exam period, the committee will meet to determine if the student has passed the exam.

2. *Review Paper Format*

The format of the review paper is left to the discretion of the student and the examination committee. Any consistent style is acceptable as long as the paper is clear, concise, and legible. A suggested guide for the paper format may be obtained from The Chicago Manual of Style [16th Ed., The University of Chicago Press, available online or through the library] or similar publication. Following a good example review paper from one of the various recommended academic journals by the faculty would also be prudent. The review paper must be typed, double-spaced and free from any extensive errors, including typographical, grammatical, and formatting as well as technical content. The title and signature pages must be the first two pages of the review paper.

F. Leading to Ph.D. Degree in ChE

The general procedures for students pursuing doctoral degrees at the University of Idaho are contained in the University Catalog and COGS website. Each student is responsible to read and understand these general rules/regulations. Each student is required to have a major professor or co-advisor [i.e., co-major professor] from the **ChE and/or BE Programs**. For convenience, the steps of progression toward a Ph.D. are outlined below (see also COGS Steps To Your Degree: <https://www.uidaho.edu/cogs/degree-steps>).

1. Qualifying examination (at the end of the first full semester, but not beyond second full semester).
2. Selection of thesis topics and appointment of major professor (as soon as possible).
3. Selection of supervisory committee (must be done prior to preliminary examination; comprised of a total of at least four members including the major professor).
4. Preparation of study plan.
5. Preliminary examination and advancement to candidacy.
6. Completion and defense (final examination) of Ph.D. dissertation.

The above steps are general to most Ph.D. programs at the University of Idaho. The ChBE department has specific requirements relating to the above items as follows.

1. Qualifying Examination

The qualifying exam is an evaluation of past performance and of potential for successfully completing a Ph.D. degree, as well as a critique of a recent research publication.

The students in chemical engineering are required to take core courses before taking the qualifying exam. The faculty may ask questions from these courses during the exam.

The student will be given 4-7 citations four weeks before the examination and asked to pick one for critique and presentation. Alternatively, students may choose their own original work as a basis for the qualifying examination, for example, a research publication or University of Idaho Chemical or Biological Engineering M.S. thesis. Students are not allowed to seek external help. A concise written paper will be presented to the faculty as a whole in two weeks and a 30-minute oral presentation will be given two weeks later. The presentation is open to public followed by a closed Q&A session with faculty.

The written report should consist of an introduction stressing significance and summarizing related work and discussion, critique, and suggestions for extension of the work no longer than the article they are reviewing. The oral presentation should follow a similar format. During the closed session the student will be questioned on both the critique and other ChE and BE concepts (as applicable to degree type sought). The faculty can question the student about M.S. work and about course work completed previously. The passing of the exam is determined by faculty majority vote.

2. Selection of Dissertation Topic and Appointment of Major Professor

The majority of the Ph.D. students are recruited by the department faculty who have funding to support research projects. In those cases, the Ph.D. student will be working with a particular faculty member providing the support from the beginning.

In the case of no major advisor assigned for an admitted student, the student should make an appointment with each of the department faculty to discuss potential research topics and funding opportunities. After completing these discussions, the student should submit a list of three top choices to the Department Chair. Every effort will be made to accommodate the student's first choice of research topic. If this is not possible, the dialogue will continue until both student and faculty are satisfied with the project assignment.

3. Ph.D. Preliminary Examination and Final Defense

The preliminary examination is the presentation of a research proposal in a form appropriate for a research-granting agency and that is related to the completion and extension of the Ph.D. dissertation topic. The subject of the proposal is determined by the major professor, student and doctoral committee. The format for the proposal will vary; but should emphasize proposed work, approaches to the problem, and the potential for discovery of new concepts.

The written proposal is first submitted to the doctoral committee for review. After making the suggested revisions, the student and major professor will schedule an oral presentation, given

on the Moscow campus, to both the committee and the Department faculty. It is customary to invite interested graduate students to attend as well. An open question and answer period will be conducted, followed by a closed session with the committee and Departmental faculty. The Department and committee may, at this time, consider other evaluative criteria and may wish to examine the student on any aspect of the Ph.D. study plan. If the committee and department judge that the student has passed the Ph.D. preliminary examination, he/she will be “advanced to candidacy” for the Ph.D. degree. Finally, when the major professor decides that the graduate student is ready to defend his/her Ph.D. dissertation. The dissertation needs to be written according to the instructions provided at the COGS website. The expected duration of a Ph.D. defense is around 40-50 min followed an extended question/answer session, first by the entire audience and then by committee and other interested faculty. A closed session of questioning proceeds the open defense presentation with only the graduate student’s committee members and other interested graduate faculty.

While the Ph.D. student needs to submit their approved dissertation to the COGS, it is recommended that by the time the Ph.D. student is defending they will have published at least two journal papers with the potential for more being accepted after graduation.

4. *Credit Requirement*

The UI General Catalog requirements should always be referenced and followed, especially where the content herein is or appears to be outdated and/or in conflict with the current Catalog rules.

A minimum of 78 credits beyond Bachelor’s degree is required. The requirements specified in COGS website supersedes departmental requirement (see Degree Requirements link in appendix D) in case of conflict. General requirement for a Ph.D. degree are:

Criteria

- a ChE 600: Doctoral Research ≥ 33 credits
 - b ChE 500 or 599 (MS Research) ≤ 6 credits
 - c Total (a+b) research credit ≥ 39 . Maximum of 45 credits counted toward degree
 - d ChE 501 or BE 501 (Seminar) ≥ 2 credits
 - e ChE 515: Transport Phenomena ≥ 3 credits
 - f ChE 529: Chemical Engr. Kinetics ≥ 3 credits
 - g ChE 541: Chemical Engr. Analysis I ≥ 3 credits
 - h ChE 5xx Elective, not counting (a, b, d-g) ≥ 3 credits
 - i Total credits ≥ 78
-

In addition to the above courses, the students can take a variety of courses from different disciplines such as Chemical Engineering, Mechanical Engineering, Nuclear Engineering, Physics, Chemistry, Business, Forest Resources and so forth. Students should consult with their major professors (and committee members as needed) for choosing the elective courses.

V. BE Degree Requirements

The general procedures for students pursuing graduate degrees at the University of Idaho are contained in the University Catalog and COGS website. Each student is responsible to read and understand the general regulations.

In-house undergraduate students, if interested to pursue graduate studies at the University of Idaho, are encouraged to think about taking some graduate courses in their final year, which must be formally “[reserved](#)” for their graduate transcript before graduating with their BS degree if they wish to count those credits toward future graduate degree. Reserved credits may not be counted toward the BS degree requirements.

A. Accelerated 4+1 Master of Engineering (M. Engr.) in BE

Accelerated 4+1 Master of Engineering Program allows current BE undergraduate students at UI to earn the M. Engr. degree in one additional year while paying in-state undergraduate fees. In order to take advantage of this program, students must apply before completing an undergraduate degree by the deadline specified on the COGS website. If the student has over the minimum number of credits for the UG degree and want to use (under criteria ‘e’ below) credits for the graduate transcript they must [submit credit reservation form](#) and approved by COGS before the end of the term in which the UG degree is awarded.

Normally, 4+1 M.E. degree will meet the following criteria.

Criteria

- a BE 599: Non-Thesis Research (≥ 3 and ≤ 5) credits
 - b BE 501 or ChE 501 Seminar > 1 credits
 - c BE 5xx credits* not counting (500,598,599) ≥ 9
 - d Undergraduate credits (400+ and B+) used for graduation = 6 credits
 - e Undergraduate credits (400+ and B+) not used for graduation in other Engineering, Math/Stat, or Science ≥ 6 credits. Count only 6 credits toward degree
 - f 500+ credits ≥ 18
 - g Total credits ≥ 30
-

*Cross listed 400/500 level course that student has used in their undergraduate curriculum cannot be taken at 500 level.

400+ means 400 or 500 level classes; B+ means B or better grade.

B. Leading to M.S. BE Degree

1. Requirements

For students who do not have biological or closely related engineering undergraduate degree, an ad-hoc graduate committee determine course deficiencies for applicants. All M.S. students are expected to carry out a research program as part of their education. No qualifying examination is required for M.S. students.

2. Graduate Admission for Students with Non-Engineering degree.

The following “deficiency” courses, or equivalent through other course work or experience, should be taken to complete the M.S. degree program:

Math 310	Ordinary Differential Equations
BE 361	Biotransport Processes
ENGR 320	Engineering Thermodynamics and Heat Transfer
ENGR 335	Fluid Mechanics
ENGR 350	Mechanics of Materials

3. Major Professor and Committee

A M.S. thesis student should have a committee with a minimum of three faculty members with the major professor as the chair of such committee. While an out-of-department committee member is not a requirement, no more than one outside member may be included in the thesis committee. The M.S. (thesis) student must defend her/his thesis before the committee and the public during the last semester of attendance.

4. Study Plan

Preferably in the first semester but no later in the end of the second semester, the student has to develop a study plan consisting of coursework to be approved by the student’s graduate committee.

The requirements specified in COGS website supersedes departmental requirement (see Degree Requirements link in appendix D) in case of conflict. The following criteria must be satisfied to get a M.S. in BE.

Criteria

- a BE 500 (Research) \geq 10 credits. Count only 10 credits toward degree
 - b BE 501 or ChE 501 Seminar \geq 1 credit
 - c BE 5xx credits* not counting (a, b, 598,599) \geq 6 credits
 - d 500+ credits \geq 18
 - e Total credits \geq 30
-

*Cross listed 400/500 level course that student has used in their undergraduate curriculum cannot be taken at 500 level.

In addition to above criteria the program of study may include courses the committee or departmental graduate faculty regards as deficiencies. Examples are courses which are required for an undergraduate degree at UI but have not previously been taken by the student. Up to six credits of these deficiency classes 300 level or above may count toward the degree requirements. Generally, the study plan includes courses related to the thesis project, and courses that fulfill the student's professional objectives.

5. *Final Examination*

An oral examination (or thesis defense) is required for all M.S. students. The purpose of the final examination is to determine if the student can demonstrate mastery of a subject in depth and demonstrate that the research program was properly carried out and sound conclusions were drawn from the results.

During the semester in which the requirements for the degree (both coursework and research) are expected to be completed, an oral examination will be requested by the student according to the guidelines of College of Graduate Studies and conducted by the student's graduate committee. In this examination, normally two to three hours in length, the student will be required to defend his/her thesis as well as answer questions on related coursework.

The format for the final examination includes that the student prepares a brief presentation (20-30 minutes in length) summarizing his/her research project. This presentation is open to the public and the student is expected to take questions from the audience during or at the end of the presentation. After the presentation, the public will be asked to leave so that the committee continues to question the student privately.

The committee may 1) pass the student with or without special conditions being attached, 2) require a re-examination at a later date, or 3) deny the degree. Appeal of a denial will follow current University of Idaho policies. Consult the College of Graduate Studies (www.uidaho.edu/cogs/) and/or the Dean of Students (uidaho.edu/student-affairs/dean-of-students) for academic appealing procedures in details.

C. Leading to Master of Engineering in BE Degree

1. *Requirements*

For students who do not have biological or closely related engineering undergraduate degree, an ad-hoc graduate committee determine course deficiencies for applicants. This degree of Master of Engineering (M. Engr.) is meant primarily for students who are interested in more coursework without the research emphasis of the M.S. degree.

Students on a research assistantship generally do not pursue a M. Engr. degree since research appointments require research work.

2. *Graduate Admission for Students with Non-Engineering degree.*

The following “deficiency” courses, or equivalent through other course work or experience, should be taken to complete the M.S. degree program:

Math 310	Ordinary Differential Equations
BE 361	Biotransport Processes
ENGR 320	Engineering Thermodynamics and Heat Transfer
ENGR 335	Fluid Mechanics
ENGR 350	Mechanics of Materials

3. *Major Professor and Committee*

During the first semester, the student will work with his/her major professor to develop a study plan. The major professor is the student’s point of contact when questions arise about his/her study at BE.

The graduate committee consists of faculty members that can help the student prepare a plan for coursework in the field of interest. For the M. Engr. degree, the committee will normally consist of three persons including the major professor.

4. *Study Plan*

The requirements specified in COGS website supersedes departmental requirement (see Degree Requirements link in appendix D) in case of conflict. The following criteria must be satisfied to get a M. Engr. in BE.

Criteria

- a BE 599: Non-Thesis Research (≥ 3 and ≤ 5) credits
 - b BE 501 or ChE 501 Seminar > 1 credits
 - c BE 5xx credits* not counting (500,598,599) ≥ 9
 - d Undergraduate courses (300+) ≤ 12 credits.
 - e 500+ credits ≥ 18
 - f Total credits ≥ 30
-

*Cross listed 400/500 level course that student has used in their undergraduate curriculum cannot be taken at 500 level.

5. *Final Examination*

A final oral examination presented to the department is required. The primary emphasis of the examination will be on the student’s project paper and on his/her coursework.

During the semester in which the requirements for the degree are expected to be completed, an oral examination will be requested by the student and conducted by the student’s graduate

committee. In this examination, normally two to three hours in length, the student will be required to defend his/her paper or project and answer questions on coursework.

The format for the final examination includes that the student prepares a brief presentation (20-30 minutes in length) summarizing his/her project paper. This presentation can be open to the public depending on the decision of the student and graduate committee.

The committee may 1) pass the student with or without special conditions being attached, 2) require a re-examination at a later date, or 3) deny the degree. Appeal of a denial will follow current University of Idaho policies. Consult the College of Graduate Studies (www.uidaho.edu/cogs/) and/or the Dean of Students (uidaho.edu/student-affairs/dean-of-students) for academic appealing procedures in details.

D. Leading to Doctor of Philosophy (Ph.D.) in BE Degree

Current study and research programs for BE Ph.D. are available at the department website (www.uidaho.edu/engr/academic-departments/be/degrees-and-programs/graduate). Admission to this program is dependent upon the student's interests being compatible with the research objectives of the department and the interest and support of a faculty member. A student is admitted only after a thorough review of the student's academic background, career objectives, research interests and potential. Although the student carries out the program under the supervision of a major professor, considerable initiative, ingenuity, motivation, and independent thought in research are needed to qualify for the degree.

1. Admission to the Department

Students should apply to admission to the department's Ph.D. program through the Graduate Admissions at UI (www.uidaho.edu/admissions/graduate). For students who do not have biological or closely related engineering undergraduate degree, an ad-hoc graduate committee determine course deficiencies for applicants. Students receiving M.S. or M. Engr. degrees should not automatically assume that they can continue their studies for a Ph.D. Each Ph.D. applicant is evaluated based on his/her suitability for the department's research program and his/her past performance.

2. Graduate Admission for Students with Non-Engineering degree.

The following "deficiency" courses, or equivalent through other course work or experience, should be taken to complete the M.S. degree program:

Math 310	Ordinary Differential Equations
BE 361	Biotransport Processes
ENGR 320	Engineering Thermodynamics and Heat Transfer
ENGR 335	Fluid Mechanics
ENGR 350	Mechanics of Materials

3. *Language Requirements*

The BE department does not have a mandatory foreign language requirement for the Ph.D. degree.

4. *Major Professor and Graduate Committee*

Each student is required to have a co-advisor [i.e., co-major professor] from the **ChE and/or BE Programs**. The major professor should be appointed as soon as possible after a student is accepted into the Ph.D. program.

During the student's first year, a graduate committee will be appointed. This committee will be comprised of a total of at least four members including the major professor. At least half of the committee members shall be from the department. These members will provide guidance in preparing the plan of coursework and in reviewing the research topic and research plan of work. The same form that is used to appoint the committee also serves to notify the College of Graduate Studies of the intention to work towards a Ph.D. degree. This committee will meet to evaluate the student's potential for obtaining the Ph.D. degree. This evaluation includes not only an estimate of the student's ability to complete the coursework but also the student's potential for pursuing independent research. Based on this evaluation, the committee will develop a plan for a qualifying examination and implement that plan preferably before the end of the student's first year but no later than the end of the second year.

5. *Qualifying Examination*

The qualifying exam is an evaluation of past performance and of potential for successfully completing a Ph.D. degree, as well as a critique of a recent research publication.

The students in biological engineering are required to take qualifying exam by the end of fourth semester after admission.

The student will be given 4-7 citations four weeks before the examination and asked to pick one for critique and presentation. Alternatively, students may choose their own original work as a basis for the qualifying examination, for example, a research publication or University of Idaho Chemical or Biological Engineering M.S. thesis. Students are not allowed to seek external help. A concise written paper will be presented to the faculty as a whole in two weeks and a 30-minute oral presentation will be given two weeks later. The presentation is open to public followed by a closed Q&A session with faculty.

The written report should consist of an introduction stressing significance and summarizing related work and discussion, critique, and suggestions for extension of the work no longer than the article they are reviewing. The oral presentation should follow a similar format. During the closed session the student will be questioned on both the critique and other ChE and BE concepts (as applicable to degree type sought). The faculty can question the student about M.S. work and

about course work completed previously. The passing of the exam is determined by faculty majority vote.

6. *Study Plan*

The requirements specified in COGS website supersedes departmental requirement (see Degree Requirements link in appendix D) in case of conflict. The following criteria must be satisfied to get a Ph.D. in BE.

Criteria	
a	BE 600: Doctoral Research ≥ 33 credits
b	BE 500 or BE 599 (MS Research) ≤ 6 credits
c	Total (a+b) research credit ≥ 39 . Maximum of 45 credits counted toward degree
d	BE 501 or CHE 501 Seminar ≥ 2 credits
e [#]	BE 5xx credits*, not counting (a, b, 598) ≥ 15 credits
f	Total credits ≥ 78

*Cross listed 400/500 level course that student has used in their undergraduate curriculum cannot be taken at 500 level.

Upon recommendation from major professor and majority of faculty vote, BE 5xx courses may be replaced by other graduate level courses.

7. *Preliminary Examination*

All students pursuing a Ph.D. degree at BE will be required to take a preliminary examination. The intent of the examination is to evaluate whether the student has adequate knowledge and preparation, or his/her readiness, to conduct his/her dissertation research.

The preliminary examination takes the form of a written research proposal administered by the student's graduate committee. It is designed to help the student organize and plan a research project and to give the student experience in writing a research proposal for critical review on the topics in the field. The essential constituents of nearly all proposals are outlined as follows:

- a) Statement of Problem
- b) Justification of the Project
- c) Objectives of the Project
- d) Discussion of Related Research
- e) Theoretical Procedure
- f) Facilities, Equipment, and other features of the Project
- g) Anticipated Results
- h) Personnel
- i) Project Timetable
- j) Budget

Preparation of the proposal should begin upon selection of a research topic. A substantial portion of the proposal will be valuable in writing the final dissertation. In particular, items (a) through (f) will appear in nearly all dissertations. A format should be chosen consistent with the nature of the project.

The research proposal is to be presented orally to the student's graduate committee. During this presentation, the student can be questioned in any manner deemed appropriate. Upon satisfactory presentation of the research proposal, the student will be admitted to Ph.D. candidacy. The committee may ask that the proposal be revised if it is not satisfactory. The Advancement to Doctoral Candidacy Form is filed by the major professor after the graduate committee passes the candidate.

8. *Final Examination*

All Ph.D. candidates are required to take a final examination which is a defense of the dissertation. This will normally be two to three hours in duration. The student prepares the Final Defense form, which is to be given to the major professor at the beginning of the exam. During this examination, the student will present the results of the research project approved during the preliminary examination. The graduate committee is free to question the student in any manner deemed appropriate.

The format for the final examination will be for the student to prepare a presentation (typically 30-40 minutes in length) summarizing their research project. This presentation is open to the public and the student is expected to take questions from the audience during or at the end of the presentation. After the presentation, the public will be asked to leave so that the committee continues to question the student privately.

Particular attention will be paid to interpretation of the results since this is the core of doctoral level research. The graduate committee can ask the student to justify any or all inferences and conclusions drawn from the research as well as application to a wider scope of study than that under question.

The graduate committee may 1) pass the student, 2) require rewriting of the dissertation and a re-examination at a later date, or 3) deny the degree. Re-examination cannot occur earlier than eight weeks after the first examination.

Appeal of a denial will follow current University of Idaho policies. Consult the College of Graduate Studies (www.uidaho.edu/cogs/) and/or the Dean of Students (uidaho.edu/student-affairs/dean-of-students) for academic appealing procedures in details.

VI. Important Graduate Procedures/Forms

For convenience, the steps of progression through your degree program are outlined by **COGS Steps to Your Degree:** <https://www.uidaho.edu/cogs/degree-steps>. This includes

appointment of the major professor, committee members, study plans, how to prepare, defend and submit your thesis or dissertation, and graduation info.

A. Registration for Full-time Status

Each semester, a full-time graduate student should register for at least 9 credits, though 12 credits or more are common for non-thesis degree-seekers or those wishing to complete coursework and perhaps the degree more quickly than usual. The typical course load will be 2 or 3 lecture-based 3-credit courses, a graduate seminar (e.g., CHE 501), and potentially (though not required) one or more thesis or non-thesis project credits (viz., 500, 599, 600). In order to get a more effective start toward research, the early selection of a major advisor with a project (funded or unfunded) is highly recommended.

It is important to maintain good grades (A or B) in all coursework. A grade of C or better is required in all courses used to meet the degree requirement. A cumulative GPA of 3.0 is to be maintained for good standing, viz., to avoid academic probation. A final cumulative GPA of 3.0 is required including all courses on the graduate transcript, whether or not they are used for the degree.

B. Choosing a Major Advisor and Committee for Research

If the Department did not accept the student to work directly with a particular graduate faculty advisor before arrival, it is the student's responsibility to schedule meetings with program faculty who have funded projects suitable for their mutual interests toward a thesis or dissertation project. COGS should be informed of the major advisor assignment (via official form notification) no later than Finals Week of the first semester enrolled, except for non-thesis degree-seeking students.

The non-thesis project advisor (or advisory committee) should be established during the semester prior to enrolling in CHE or BE 599 to begin work on the non-thesis project.

A M.S. thesis student should have a committee with a minimum of three faculty members with the major professor as the chair of such committee. While an out-of-department committee member is not a requirement, no more than one outside member may be included in the thesis committee. The M.S. (thesis) student must defend her/his thesis before the committee and the public during the last semester of attendance.

A Ph.D. committee should consist of four faculty members, at least two of which should be from the degree discipline.

Thesis and dissertation committees may include adjunct (non-UI employee) members as one of the required members or as additional members.

C. Forming the Degree Committee

The student is responsible to begin the paperwork to be completed for the appointment of thesis/dissertation committee, in consultation with her/his major professor. This should be completed early in the research project development for effective selection of committee members who will be helpful in support of the project and its successful completion.

D. Filing a Study Plan for Degree Audit toward Specific Graduation Requirements

In collaboration with the major advisor, the student should develop and submit her/his study plan (online) for the department and COGS approval during the second semester enrolled. The study plan may be updated periodically as needed and must reflect the relevant course requirements outlined in one or more (in the case of pursuing concurrent degrees) of the following subsections (and the General Catalog) as applicable.

See the online tutorial for more details: <https://www.uidaho.edu/registrar/graduation/audit>.

E. Annual Performance Review of Graduate Student

All research students are required to fill out the annual graduate student performance review form and get it signed by the academic advisor and the Department Chair. They can keep a copy for reference. The Department sends the final copy to COGS. The process should be completed each year by May 1.

F. Time to Degree Completion

The typical timeframe for completing a graduate degree is 1.5-2 years for M.S./ME and for Ph.D. 3-4 years with a master's degree completed previously. Courses are offered in such a way so that students can complete course requirements within these ranges.

Note that the ultimate responsibility falls on the graduate student to know what steps are needed to complete his/her degree requirements. If in doubt, feel free to ask your major advisor and/or the COGS Graduate Student Services Manager (Lana Unger) for clarifications.

VII. Academic Performance and Annual Review

It is the Department's regular practice to assign the grade of IP (= In-Progress) for those research credits designated 500 (thesis) and 600 (dissertation). This delays the weighing of research quality into the GPA until after the defense and written documents have been evaluated. However, the major research advisor may assess one semester's activity and quality for an assigned grade on the regular A/B/C/D/F scale. Successfully defending one's thesis or dissertation does not automatically equate to earning all grades of A, for example, in 500/600 courses. The replacement of IP grades with regular letter grades at the end should reflect the quality of student accomplishment.

VIII. Safety and Integrity in Research and Creative Activities

Safety first. If you see something, say something. Our department has a safety committee as well as a faculty or staff member appointed to the College level Safety Committee. Our College of Engineering (COE) also has a representative on the University-level safety committee. Please contact our office staff for current contact names and information concerning any safety matter.

In general, no lab or shop space should be entered without proper personal protection. These almost always include goggles or other approved eye-shield (dependent on activity and associated dangers) and gloves when handling chemicals, hot and/or sharp surfaces, etc., as well as the less-common PPE for chemical and BE, which may include lab coats, smocks, booties, hairnets and masks; laser shields (for blocking particular wavelengths from their scattered sources), respirators, etc.

Long hair, jewelry (including watches and wedding bands), and loose-fitting clothing (including ties, scarves, dangling belt ends or other straps) also pose personal risks in working areas that are often overlooked or forgotten. We highly recommend discussing these and any particulars with your supervisor (instructor, faculty, staff, TA, or senior-mentor students) before working in your designated area(s).

Personal integrity and work ethic are of utmost importance to us, which includes the highest standards for safety but also your work products. Plagiarism of any kind will not be tolerated in your coursework, reports, presentations, posters, manuscripts, publications, or any other mediated information transmission; this includes the copying of your own previous words or other work in other forms without correct attribution and full citation, which may require formal copyright permission from the publisher.

For other questions on academic or engineering ethics and integrity in your graduation program experience, your faculty advisor, graduate student committee members, Graduate Program Coordinator, Department Chair, COE and COGS deans, and other faculty and staff members are available for mentoring and discussion.

IX. Conduct of Research

A major portion of the student's time will be spent in conducting a research program and writing a thesis or dissertation based on the results of that program. Although a student may be working on a fairly large project at times, only one portion will normally be chosen for the thesis. This chapter presents some general principles to be followed in planning and conducting research that will form the basis of the thesis or dissertation. At all times, when planning and carrying out the research, the student should regularly consult with his/her major professor and, if necessary, his/her graduate committee.

A. Research Records

During thesis research, students will take a voluminous amount of data along with many notes, reminders, procedures, etc. It is very important to keep these materials in an organized

fashion. Students must also zealously protect the data from any harm. Following a guideline that have proven successful in safe-guarding research records. Bear in mind that students will have to find the best practice suitable for his/her research project. For example, field projects or data intensive projects will require a different format than an analytical or simulated project.

B. Maintain Research Notes

Every graduate student should maintain research notes, either in a ring binder, a spiral bound note, a research note, or electric files.

Research notes should be a daily diary or logbook of what students do. Record all activities such things as materials purchased, people visited, ideas discussed, references mentioned by someone, weather conditions, service obtained, designs worked on, trials or tests, equipment lists, results of computer run, statistical calculations, and so on.

C. Data Collection

Be sure to write down everything in research in a manner so that someone else can replicate the research by reading your research notes. Poor documentation and data collection procedures are not considered a good research practice and make it difficult to replicate, an experiment should be replicable. This does not mean that someone else must get the same data in your research, but they must arrive at the same general conclusions.

Please note that all research notes are the properties of the university. Graduate students must submit all research notes, both hard copies and electronic copies, to his/her major professor before his/her final examination or thesis defense is considered complete for signing off.

D. Instrument Instructions and Care of Equipment

For every instrument that you operate, there should be always a set of instruction manuals, somewhere, but not where you are. Thus, make a copy for yourself and return the original to the archive place. Add notes to the instruction manuals in order to clear up any special problems or characteristics of the particular machine and share your observations with laboratory manager.

When equipment is used on a project, it is expected that it will be properly maintained and operated. It is the user's responsibility to maintain a good order of the equipment and report any issues timely to the laboratory manager.

Also remember the old saying: "Clean up after yourself - your mother doesn't work here".

E. Copyrights

Every research or teaching assistant must sign a Patent and Copyright Agreement at the time of accepting the assistantship. As employees of the University of Idaho, TA and RA are subject to the policies and rules of the Regents of the University of Idaho published, which is consistent with the policy by the Idaho State Board of Education (https://boardofed.idaho.gov/policies/documents/policies/v/vm_intellectual_property_0613.pdf)

and to the policies of the University of Idaho as published in the UI Faculty-Staff Handbook and on the University's web site. The policies relevant to patents and copyrights are applicable to all graduate students who are on any assistantship and UI employees.

F. Student Travel

Before, all travels away from campus can take place, a request for travel authorization must be approved. Normally travel for field work will be done in departmental or university vehicles. When using any vehicle be sure to record mileage and budget number on the log kept in the vehicle.

Students who work at a place away from UI campus, such as the Research and Extension Centers, for an extended period, such as the entire summer, are not normally reimbursed for living expenses. Special arrangement should be made, and appropriate funds be allocated, such as requested in a research grant, for this purpose.

Reimbursement for food, lodging, and mileage is made by following the state and/or university policies. For extended stays away from campus in remote areas, other housing and food allowances may be made.

G. Use of Departmental Resource for Research

Some department resources, such as writing pads and pens, could be used by graduate research/teaching assistants for research or teaching purpose. However, resource uses that involve major expenses, such as mass copying of research reports, requires the department's approval, and appropriate charges maybe imposed from corresponding research projects.

The department's copy machine may be used for project copying only. Copying for personal or class use is prohibited on departmental copying machines. Any misuse of the copier will result in withdrawal of copying privileges. All copying is under the supervision of the administrative assistant so always check with him/her for current policies.

X. Student Conduct and Conflict Resolution

We strongly encourage all students to seek conflict resolution directly and positively with proper personal and institutional support according to the level and nature of the conflict or problem. We expect graduate students to behave professionally, as if it were their first permanent position with a company as a working engineer or engineer-in-training. Failure to display professionally accepted behavior may lead to dismissal and separation from the University of Idaho as an employee and even as a student, depending on the nature and severity of misbehavior and in accordance with all policies and provisions of the UI.

When in doubt or too far beyond one's range of comfort to deal with a situation one-on-one, the order and level to which graduate students are prompted to seek support are first with their major advisor and/or department chair, or course instructor (as relevant with grading or classroom or TA duties), or graduate committee (depending on the relevant context of the issue),

then to the College of Engineering (COE) Associate Dean of Research or the Dean, or the Dean of COGS.

Regarding a change in the major professor or degree type, see Department Chair or COGS Dean. Conflicts of interest between students and faculty will be handled by the Chair or COE Dean or Associate Dean; conflicts between students will be handled by the Chair. If students or faculty from other units are involved, the respective and commensurate administrator of both/all units will be consulted and involved in decisions.

Other resources include:

- The student conduct page <https://www.uidaho.edu/student-affairs/dean-of-students/student-conduct/academic-integrity/students>
- The Office of the Ombudsman <https://www.uidaho.edu/faculty-staff/ombuds>

XI. Graduate Assistant (GA) Employment Policies

7. All Department policies related to graduate assistants (GAs) are consistent with COGS and UI rules and regulations. A GA may be appointed as a teaching assistant (TA) for Fall and/or Spring semester(s) only, a research assistant (RA) for one or more terms (consecutive or otherwise), or as irregular or temporary help (IH/TH). Each position type may require its own mandatory training and orientation.
8. The substantial benefit of these kinds of paid positions, when available, is to assistant with living expenses while pursuing higher education. The work responsibilities for the TA/RA/IH position(s) will not necessarily align well or at all with activities that add toward the completion of your degree, even though RA and IH appointments often are for project deliverables with clear overlaps and synergies to your thesis or dissertation work.
9. It is most important to recognize that you are not being paid to take courses, to do homework related to those courses, to pursue or complete requirements for your research or project course credits (500, 599, 600), nor for any other particular or general activity needed in part or in whole for the successful completion of your degree necessarily.
10. Office space, desk, and chair are provided and will likely be shared by one or more graduate students. These may be available only through your faculty advisor's laboratory or other workspace once you have selected and been approved for your preferred major professor. If the major professor cannot provide computer access, the shared student computer lab is available. The Department may have other computers available upon request, though this is not guaranteed.
11. Copy services and offices supplies are provided as they are available upon request from the office staff or supervising faculty member. The department does not provide telephone service. Unsecured mailboxes are available upon request.

12. Since graduate students are employees of the University and they abide by university rules. Please refer to the human resources (<https://www.uidaho.edu/human-resources>) page.
13. Work with your major advisor to pre-arrange your leaves.

XII. Appendix

A. Other Graduate Student Resources

Many graduate student resources can be found on the College of Graduate Studies webpages. If you are graduating in a particular semester, there are some very important deadlines related to defense/thesis/dissertation. Please make sure you follow those dates. If you do not follow, you may not be able to complete all the requirements for graduation. Check:

<http://www.uidaho.edu/cogs/deadlines>.

Thesis and dissertation resources (<http://www.uidaho.edu/cogs/student-resources/gradwriting>), and newly admitted (<http://www.uidaho.edu/cogs/admitted>), and current or returning students (<http://www.uidaho.edu/cogs/currentstudents>). Information changes from year to year, and this section is more to make students aware of where to look and not to provide current information on graduate student resources.

- Resources provided by COGS; a comprehensive list of specific initiatives is available from <https://www.uidaho.edu/cogs/student-resources>
- COGS/University award opportunities <https://www.uidaho.edu/cogs/awards-grants>
- COGS and university opportunities to share their work with the university community i.e. 3MT, Innovation Showcase, Engineering Expo, etc.

For returning/current UI graduate students to re-enroll in a specific graduate degree program, click on the following link: <https://www.uidaho.edu/admissions/graduate/reenrollment>.

B. Student Clubs

Graduate students are welcome to participate in the professional student society chapters.

The departmental student clubs are:

[AICHE](#): American Institute of Chemical Engineers.

[ASABE](#): American Society of Agricultural and Biological Engineers

[BMES](#): Biomedical Engineering Society

[VCEC](#): Vandal Clean Energy Club

To find more about these clubs and others please visit <https://www.uidaho.edu/current-students/student-involvement/clubs/find-a-club>

There are many activities ranging from hosting guest speakers, field trips, get-togethers, conference visits, and so forth. All graduate students are encouraged to actively participate in these activities as they learn important leadership and managerial skills and get help with professional networking.

International students are a big part of our graduate student population. They can find some useful information on www.uidaho.edu/international. There are also a number of international student clubs on-campus. International graduate students are encouraged to participate in those clubs.

C. Miscellaneous Tips

You are expected to....

- ✓ Be PROACTIVE.
- ✓ Dedicate yourself and work hard (but do so intelligently)! You are expected to put the best effort beyond minimum to be effective in what you do.
- ✓ Have a weekly meeting scheduled at pre-determined time but feel free to check in if the matter cannot wait.
- ✓ Write at least 1-page per day on your thesis, paper, or other report.
- ✓ Work closely with other research group members and maintain a friendly relationship.
- ✓ Take classes but transition to putting effort into your thesis research.
- ✓ Begin writing your thesis as soon as you start your research. Concurrently do your research and writing.
- ✓ Read archived publications regularly.
- ✓ Attend research group meetings and report weekly research progress.
- ✓ Maximize your time on research in order to finish your thesis research.
- ✓ The thesis is NOT about regurgitating what you learned from your course work. You need to create new knowledge.

D. Useful links dates deadlines

COGS deadlines	www.uidaho.edu/cogs/deadlines
All graduate forms	www.uidaho.edu/cogs/forms
<ul style="list-style-type: none"> ➤ Major professor/ Committee Appointment form ➤ Non-UI Faculty Committee Member Appointment ➤ Creating & Entering a New Study Plan ➤ Changing a Study Plan 	

<ul style="list-style-type: none"> ➤ Report of Preliminary Examination & Advancement to Candidacy ➤ Thesis & Dissertation Handbook ➤ Request to proceed with final defense ➤ Repository Agreement 	
Add/Drop Form	www.uidaho.edu/registrar/forms
Credit Reservation	https://www.uidaho.edu/-/media/UIDaho-Responsive/Files/registrar/Forms/CreditReservation.pdf
College of Graduate Studies How-to-Guides	www.uidaho.edu/cogs/currentstudents/guides/howto
COGS Master of Science Degrees Requirements	https://catalog.uidaho.edu/colleges-related-units/graduate-studies/masters-degrees/#generalrequirements
COGS Master of Engineering Degree Requirements	https://catalog.uidaho.edu/colleges-related-units/graduate-studies/masters-degrees/#specificrequirements
COGS Doctoral Degrees requirements	https://catalog.uidaho.edu/colleges-related-units/graduate-studies/doctoral-degrees/#generalrequirements
M.S. Chemical Engineering	https://www.uidaho.edu/engr/departments/chbe/degrees/cheme/ms
M. Engr. Chemical Engineering	https://www.uidaho.edu/engr/departments/chbe/degrees/cheme/mengr
Ph.D. Chemical Engineering	https://www.uidaho.edu/engr/departments/chbe/degrees/cheme/phd
M.S. Biological Engineering	https://www.uidaho.edu/engr/departments/chbe/degrees/be/ms
M. Engr. Biological Engineering	https://www.uidaho.edu/engr/departments/chbe/degrees/be/mengr
Ph.D. Biological Engineering	https://www.uidaho.edu/engr/departments/chbe/degrees/be/phd