


GRADUATE STUDENT HANDBOOK

2020-2021

IOWA STATE UNIVERSITY
Department of Chemical and Biological Engineering

cbe.iastate.edu

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1. Degree Requirements and Procedures

The Department of Chemical and Biological Engineering (CBE) offers three graduate degrees in Chemical Engineering (Ch E): Master of Engineering (M.Engr.), Masters of Science (M.S.) and Doctor of Philosophy (Ph.D.). The department also offers a graduate minor in Chemical Engineering.

After completing a graduate level degree in chemical engineering in CBE, students will be able to:

- Demonstrate comprehensive understanding of scholarly literature in the area of study.
- Form testable hypotheses and articulate research objectives that, when met, will lead to significant contributions to the field of study.
- Conduct quantitative research via appropriate acquisition, analysis, and reporting of data.
- Interpret research results appropriately, integrating them into the existing knowledge in the discipline.
- Clearly and accurately communicate research findings orally and in writing.
- Conduct independent scholarship in ways that consistently demonstrate ethical practice and professionalism.

Below is an outline of the requirements and processes to obtain a graduate level degree from CBE. Flowcharts for completing these degrees can be found in Appendix A and B.

1.1 Master of Engineering Degree (M.Engr.)

1.1.1. Degree Requirements

Coursework requirements for the M.Engr. degree are 30 credits of graduate or non-major graduate credit coursework. A minimum of 18 credits must be Ch E graduate level coursework and must include at least two courses chosen from Ch E 545, 554, 583, and 587. Up to six credits can be a creative component (Ch E 599). Application of any Ch E 599 credits toward the degree requirements necessitates forming a Program of Study Committee (POSC).

1.1.2. Creative Component or Coursework Only Options

Students pursuing the M.Engr. degree have the option to complete the degree as a coursework only degree or to complete a creative component as a part of the degree. A creative component is an independent component of work supervised by a faculty member. Students completing a creative component as a part of their M.Engr. degree should discuss their options for a creative component with the Director of Graduate Education (DOGE).

1.1.3. M.Engr. Program of Study Committee (POSC) and POSC Form

Each M.Engr. student, in collaboration with their major professor, shall identify the faculty members to serve on an advisory committee, also called the Program of Study Committee (POSC). This committee guides and evaluates the student during the period of graduate study. Normally the student will ask individual faculty members to serve on the committee after consultation with the major professor.

For M.Engr. students completing a creative component, the faculty member supervising the Ch E 599 credits serves as the major professor. If a student is completing the coursework only option for the M.Engr. degree, the DOGE for the department will serve as the student's adviser and approves the POSC form.

For M.Engr. students completing a creative component, the POSC will consist of the major professor and two additional faculty members. One of the additional faculty members must be from the CBE department. If completing a graduate minor, one of the faculty members must be from the minor's department. Once the student has confirmed their committee, the student can go on AccessPlus to complete and route the POSC form. No POSC meeting is required for M. Engr. students.

M.Engr. students are required to submit the POSC form within four months of beginning the program and must be approved by the final day of the semester prior to taking the Final Oral Examination or the semester prior to graduation (for coursework only students).

1.2 Master of Science Degree (M.S.)

1.2.1 Degree Requirements

Coursework requirements for the M. S. degree are 30 credits of graduate or non-major graduate credit coursework. A minimum of 15 credits of this must be non-research coursework, including 12 credits of Ch E courses. This Ch E coursework must include two courses chosen from Ch E 545, 554, 583, and 587. In addition to the Ch E courses, a minimum of three credits of coursework must be taken outside of the department, not including GR ST 565.

1.2.2 Research Project and Major Professor Selection

Students pursuing the M.S. degree are assigned a major professor through the admissions process based on their expressed research interests outlined in their admissions application. The major professor will oversee their research work during their time in the program.

1.2.3 M.S. Program of Study Committee (POSC) and POSC Form

Each M.S. student, in collaboration with their major professor, shall identify the faculty members to serve on an advisory committee, also called the Program of Study Committee (POSC). This committee guides and evaluates the student during the period of graduate study. Normally the student will ask individual faculty members to serve on the committee after consultation with the major professor.

For M.S. students, the POSC will consist of the major professor and two additional faculty members. One of the additional faculty members must be from the CBE department. If completing a graduate minor, one of the faculty members must be from the minor's department. The committee must include at least one member from a different field of emphasis to ensure diversity of perspectives. Once the student has confirmed their committee, the student can go on AccessPlus to complete and route the POSC form. No POSC meeting is required for M. S. students.
M.S. students are required to submit the POSC form within four months of beginning the program and the form must be approved by the final day of the semester prior to taking the Final Oral Examination.

1.3 Doctor of Philosophy (Ph.D.)

1.3.1 Degree Requirements

Coursework requirements for the Ph.D. degree are 72 graduate credits of graduate or non-major graduate credit coursework. A minimum of 26 credits of this coursework must be non-research coursework, including 16 credits of Ch E coursework. This Ch E coursework must include Ch E 545, 554, 583, and 587, Ch E 698A, and two terms of Ch E 698B. Additional credits of graduate or non-major coursework must include GR ST 565 and elective courses. At least three credits of non-research coursework need to be 600-level course(s) graded on an A-F scale. These elective courses will be determined together by the student and the Program of Study Committee (POSC), depending upon the research area of the student, and can be within Ch E or outside. The Graduate College requires that the topics of independent study credits (Ch E 590/692) applied to the degree be identified on the POSC form and approved by the POSC. Generally, independent study credits in the doctoral studies are indicated only for work done clearly outside the scope of the thesis project, under the direction of a member of the faculty that is not the student's major professor.

Many students will take more coursework than the minimum listed above to improve identified deficiencies or to achieve special needs that relate to their research. The student's POSC will determine these courses.

1.3.2 Research Project and Major Professor Selection

Students needing to be assigned a research project will listen to oral presentations by faculty with openings that are available to choose from during the department's orientation. The student should discuss projects of interest with the appropriate professors. Before the deadline, usually a month into the semester, the student will submit a list of preferred projects and major professors to the Director of Graduate Education (DOGE).
Within the limitations of faculty time and funding, students will be assigned a project and research professor on their preferred list. The major professor assigned will be the chair of the student's POSC.

1.3.3 Research Progress Exam (Qualifier)

During a student's first year in the program, they are conditionally on track to complete the Ph.D. program. Full admission of students to the Ph.D. program by the department faculty is based on achievement in graduate core courses and progress in research. This achievement is evaluated through the Research Progress Exam (Qualifier). The Qualifier is usually completed a year after entering the program.

To obtain full admission to the Ph.D. program, students must maintain an average GPA of 3.50 or higher in the four core Ch E courses: Ch E 545, 554, 583, and 587. Students are required to submit a five-page report summarizing their research progress. Students will present their report during a research progress seminar to a committee of at least three faculty members from the department. The committee will include the student's major professor(s), and two other faculty members chosen by the DOGE. The report should be prepared **without** any input from the major professor. The report should be formatted as follows:

- single-spaced, single column per page, and 1-inch margins on all sides
- Times New Roman 11 font.
- Figures and tables should be placed at the end of the document and do not count toward the five-page limit.

The report should be submitted to the committee at least one week in advance of the research seminar. During the seminar, students should demonstrate a good understanding of their research problem and report specific accomplishments in their research to date. A research rubric describing the research progress expectations is located in Appendix C.

Once a student has completed the research progress seminar, the faculty will vote on the student's continued status in the program. The faculty will take into account recommendations from the student's major professor and the Qualifier committee about the student's research progress and the student's coursework performance.

Based on faculty vote, a student's Qualifier may have one of the following outcomes:

- The student is admitted directly to the Ph.D. program.
- The student is approved to go on for a Ph.D., with the requirement of completing a M.S. first.
- The student is approved conditionally to continue directly for a Ph.D., with the option of asking the student to stop with a M.S. if there is no satisfactory improvement by the preliminary examination.
- The student is directed to stop with a M.S. degree.

Students may also be asked to complete additional work to address unsatisfactory course performance, including retaking a graduate or undergraduate course or serving as a teaching assistant for an undergraduate course.

1.3.4 Ph.D. Program of Study Committee (POSC) and POSC Form

Each Ph.D. student, in collaboration with their major professor, shall identify the faculty members to serve on an advisory committee, also called the Program of Study Committee (POSC). This committee guides and evaluates the student during the period of graduate study. Normally the student will ask individual faculty members to serve on the committee after consultation with the major professor.

For Ph.D. students, the POSC will consist of at least five members of the graduate faculty. At least three members of the POSC, including the major professor, must be from the CBE department. If completing a graduate minor, one of the faculty members must be from the minor's department. The committee must include at least one member from a different field of emphasis to ensure diversity of perspectives. After the selected faculty members have agreed to serve on the committee, the student can set up a meeting with their committee members to develop a program of study (coursework that the student will need to complete as part of their graduate program). Once the student has met with their committee and the committee has agreed on the coursework, the student can go on AccessPlus to complete and route the POSC form. The POSC form serves the dual purpose of: (1) identifying faculty members who will serve on the student's committee, and (2) selecting all the coursework that will count toward the degree.

Ph.D. students are required to submit their POSC form within six months of completing their Qualifier, and the form must be approved by the final day of the semester prior to taking the Preliminary Oral Examination. If a M.S. degree is completed en route to the Ph.D., the student must submit their Ph.D. POSC by the end of the semester following completion of their M.S. degree.

1.3.5 Preliminary Oral Examination

A student becomes a candidate for the Doctor of Philosophy degree after successfully completing a preliminary examination. The Preliminary Exam is intended to assess whether or not the student has:

- met doctoral-level standards for general knowledge in chemical and biological engineering, in supporting subject areas, and in the student's area of expertise.
- developed the capabilities or facilities needed to complete their research project.
- can demonstrate the ability to use such knowledge and to orally communicate it to others.

Students admitted prior to the fall 2020 term are required to take the Preliminary Exam two years after their Research Progress Exam. Considerable research progress is expected at this important milestone. Many students will have published at this point or will have manuscripts nearly ready for peer review.

Students admitted during the fall 2020 term and later are required to take the Preliminary Exam no later than six academic terms after successfully completing their Research Progress Exam or their Master's degree (an academic year consists of Spring, Summer, and Fall terms). Failure to meet this expectation constitutes grounds for probationary status. Considerable research progress is expected at this important milestone. Many students will have published at this point or will have manuscripts nearly ready for peer review.

At least three weeks before the date of the preliminary examination, the student must submit a Request for Preliminary Examination to the Graduate Office through the online form at https://secure.grad-college.iastate.edu/exam/.

A written research report, prepared by the student, should be given to the POSC **two weeks in advance of the examination**. Consultation with the major professor is permissible and encouraged. The report should be organized into chapters that present the significance of the problem and the objectives of the research, a review of the present state of knowledge in the area, a description of the research plan, results to date, and plans for completing the project. Research results to date will typically span multiple chapters, with each chapter comprising a peer-reviewed journal article or a manuscript to be submitted as such. The document should provide citations in a manner appropriate for the field. Figures, tables and other data must be properly attributed to collaborators or external sources. The format should follow that used for the final dissertation unless otherwise directed by the POSC. Formatting guidelines for ISU theses are summarized at https://www.grad-college.iastate.edu/current/thesis/checklist/. It is particularly important that chapters in manuscripts that may be published or that are in any stage of publication follow the "Journal Paper Format" guidelines for attribution of co-authors. Immediately prior to the preliminary examination, the student will present to the department and the POSC a public seminar describing the research results to date and future work.

After a Preliminary Examination is complete, the student and POSC will need to sign the Report of Preliminary Oral Examination to verify the outcome of the Preliminary Exam. The form is available online on the Graduate College website but is provided to the major professor as a part of a student's Preliminary Exam materials. Completed reports should be submitted to the Program Assistant for Graduate Students in 2114 Sweeney.

1.4 Degree Completion and Final Oral Examinations

1.4.1 Application for Graduation

By the deadline posted for the semester of graduation, students should submit an application for graduation through AccessPlus. Students can access this graduation application by logging in to their AccessPlus account and selecting Graduation from the left side menu under the Student tab.

1.4.2 Coursework Only Final Check

M.Engr. students completing a coursework only program must submit a Coursework Only Final Check by the deadline indicated for their graduation term. The form is available online at https://www.grad-college.iastate.edu/student/forms/coursework-only/.

1.4.3 Final Oral Examination

As a part of the final examination procedure, candidates for the M.S. or Ph.D. degree are required to give a public seminar to present and defend their research dissertation. The final examination for the M.S. and Ph.D. degrees consists of a one-hour general presentation in a public seminar, followed by an examination by the candidate's POSC.

M.Engr. students completing a creative component must also complete a final oral exam. The final for M.Engr. students should comprise of a seminar of at least 20 minutes.

Students must submit an online Request for Final Oral Examination form to the Graduate College Office **at least three weeks before the examination at** https://secure.grad-college.iastate.edu/exam/. The Graduate College must approve any changes in the membership of the POSC or coursework on the POSC form before the final examination occurs. Students must submit their thesis, dissertation, or special report to their POSC **at least two weeks before the examination**.

After a Final Oral Examination is complete, the student and POSC will need to sign the Report of Final Oral Examination to verify the outcome of the Final Exam. The form is available online on the Graduate College website but is provided to the major professor as a part of a student's Final Exam materials. Completed reports should be online.

1.4.4 Thesis, Dissertation, and Special Reports

Before graduation, students must prepare a thesis or dissertation (or a special report in the case of M.Engr. students completing a creative component). Formatting guidelines for ISU theses are summarized at https://www.grad-college.iastate.edu/current/thesis/checklist/. The student and major professor must determine whether or not the results are to be published and

what the student's responsibilities are in the publication process. It is normally expected that the student will at least complete the draft of a research paper prior to departure.

A student's thesis, dissertation, or special report must be uploaded to a repository by the required Graduate College deadline. Students completing the Ph.D. and M.S. degree must submit their thesis or dissertation to ProQuest (http://www.etdadmin.com/cgi-bin/home). M.Engr. students completing a creative component must submit their special report to the ISU Library (https://lib.dr.iastate.edu/cgi/ir_submit.cgi?context=creativecomponents).

1.4.5 Graduate Student Approval Form

After completing the Final Oral Exam and the exit survey, students must complete a Graduate Student Approval Form. Individuals from various offices sign this form to indicate that the student has completed the degree requirements and has met all other obligations to be eligible for the degree. The form is online.

1.5 Graduate Minor in Chemical Engineering

Graduate students in other departments who do not have Ch E backgrounds can obtain a minor in Ch E by completing 12 credits of 300-, 400- or 500-level Ch E courses. At least 9 of these credits must be in core Chemical Engineering courses, and not elective courses. A CBE faculty member must serve on the student's POS committee to help guide the selection of courses for the minor.

2. Departmental Policies and Procedures

2.1 Additional Coursework for Students without a Chemical Engineering B.S. Degree

Even though the vast majority of graduate students in the program are chemical engineers, the department does admit highly qualified students from non-Ch E backgrounds. To prepare these students for graduate coursework in chemical engineering, the Department has developed **Ch E 412X – Core Concepts for Chemical Engineers**. This course is typically completed the summer prior to a student's first fall term and must be successfully completed before attempting any graduate Ch E coursework. Ch E 412X cannot be applied to the POSC Form.

Students who do not successfully complete Ch E 412X will need to take up to 5 undergraduate level courses in Ch E and Math to enhance their preparation for taking graduate level Ch E coursework. Credit earned in these courses is not applied to the POSC Form. Based on their undergraduate specialty, students will need to earn a "B" or better in undergraduate Ch E courses as per the table below:

Course	Title	Prerequisite	ISU Course
Ch E 545	Analytical and Numerical Methods	1 semester undergraduate differential equations course	Math 267
Ch E 554	Integrated Transport Phenomena	2 semesters undergraduate transport phenomena (fluids, heat, mass transfer)	Ch E 356, 357, 381

Ch E 583	Advanced Thermodynamics	1 semester thermodynamics course	Ch E 381
Ch E 587	Advanced Chemical Reactor Design	1 semester reactor design course	Ch E 382

At the beginning of their program, students will need to identify the courses they will be required to take on the **Non-Ch E Student Graduate Preparatory Coursework Worksheet**. Students will need to submit this worksheet to the Director of Graduate Education (DOGE). This worksheet should include transcripts documenting courses that fulfill the prerequisite requirements, if taken from an institution other than Iowa State University.

2.2 Transfer Credits

If students wish to transfer graduate-level course credits from previous institutions, they must complete the CBE Graduate Transfer Credit Worksheet and submit to the DOGE for approval.

In general, the following policies apply:

- Eligible courses include lecture or lab courses that are eligible for graduate credit at the other institution.
- Research credits, seminar credits, or research ethics credits are not eligible for transfer.
- The 600-level course requirement may not be satisfied with transfer credits.
- The course must have been taught by a member of that institution's graduate faculty.
- The course must not have been applied to an undergraduate degree that you earned while at that institution. This must be clear on the transcript or attested to by a letter from the other institution.
- A grade of "B" or better is required.
- The POS committee must approve the inclusion of all transferred electives on the POS form. This means that although your elective credits may transfer, it is up to your POS committee to determine if they can be used to satisfy your degree requirements.

2.3 Orientation and New Graduate Student Checklist

All new graduate students in CBE must attend the department's orientation session and complete the steps and training listed on the New Graduate Student Checklist (see Appendix D). All new graduate students will be assigned a temporary office in Sweeney Hall. Upon arrival, students will need to schedule a check-in time with the Program Assistant for Graduate Students. At this time, students will complete the appropriate forms to request keys for their assigned office, entrance to Sweeney Hall, and the graduate student lounge. International students must also attend the International Graduate Student Check-in and Orientation.

2.4 Appointments and Stipends

For students on graduate assistantship, the terms of appointment are described in the student's initial offer letter of admissions. Each graduate student will be prompted to sign an Electronic Appointment Form in Workday for each academic semester of appointment unless otherwise specified. The graduate student's major professor(s) will advise them of the duties of the appointment and the accountability procedures. All appointments are reviewed annually and the student will be advised of the nature of the next year's appointment prior to the end of the academic year.

2.5 Safety Training and Requirements

Laboratory safety training for new graduate students is held each fall and presented by the Environmental Health & Safety (EH&S) Department. This is mandatory training required under state and federal law for all new employees and for any employees who have not received prior Iowa State University training. This training is required for compliance with the OSHA Laboratory Standard (29 CFR 1910.1450 "Occupational Exposure to Hazardous Chemicals in Laboratories"). If you receive a salary, wages, or a stipend for working in laboratories in CBE, you must attend this training. This includes faculty, staff, hourly wage employees, research assistants, teaching assistants, and postdoctoral students.

Topics include: OSHA Laboratory Standard, Laboratory Safety Manual, Material Safety Data Sheets, Prior Approval Procedures, Laboratory Hazards, Chemical Hygiene, Personal Protection, Housekeeping, Containers and Labeling, Hazardous Waste Disposal and Electrical Safety. Depending on what your research is, additional training may be required later. Willful failure to comply with safety requirements is grounds for dismissal.

Additional safety training may be communicated and assigned to you as deemed appropriate by the CBE Safety Committee.

2.6 Registration Requirements

2.6.1 Semester Registration

For full-time enrollment, students are required to register for 9-12 credits of coursework during the fall and spring terms. This registration must include Ch E 601: Seminar, a R credit course. During the summer term, students should register for 1 credit of Ch E 699 or 599, unless otherwise instructed by their major professor.

2.6.2 Teaching Practicum and Curricula Teaching Requirement

All Ph.D. seeking graduate students are required to participate in the teaching mission of the University by registering for a two-part teaching experience. The first component, Ch E 698A: Teaching Practicum is a weekly discussion group covering the topics of class and laboratory instruction, grading, and teaching philosophy.

The second component is Ch E 698B—Curricular Teaching Experience (CTE), in which the student participates in the instruction of Ch E course(s) under the mentorship of a CBE faculty member. Typical activities that the students will participate in as part of the CTE include:

- Actively participating in classroom lectures and/or laboratory instruction (including delivering a few faculty-supervised lectures)
- Helping instructor design homework and/or exam problems
- Participating in the formulation of projects (if any)
- Holding problem-solving recitation sessions with students
- Grading homework, quizzes, and/or lab reports

At the end of the CTE, the students will submit a short report to the graduate committee that summarizes their CTE activities, with input from the faculty instructor. All CBE doctoral students must complete at least two semesters of CTE. An additional term of CTE may be prescribed as an outcome of unsatisfactory core course performance as described in section 1.3.3. The scheduling of CTE terms will be determined in collaboration with the major professor and the associate department chair.

2.7 Satisfactory Progress and Performance in Coursework and Research

Students receiving financial support in the form of teaching or research assistantships or industrial fellowships are expected to make satisfactory progress towards their degree. In addition to completing coursework on a satisfactory timetable, students must also have satisfactory performance in their coursework and research.

2.7.1 Satisfactory Degree Progress

Although special considerations may apply in individual cases, students are expected to make acceptable progress following the timetables outlined below:
Timetable for students with a B.S. in Ch E (or successfully complete Ch E 412X) and are admitted directly to the Ph.D. program:

Event	Time since entry
Research Progress Exam	1 year
Program of Study Meeting	no later than 1.5 years
Preliminary Exam	3 years
Final Oral Exam	4 - 5 years

Timetable for students with a non-Ch E B.S. (and do not successfully complete Ch E 412X) and are admitted directly to the Ph.D. program:

Event	Time since entry
Completion of undergraduate Ch E coursework	1 year
Research Progress Exam	2 years
Program of Study Meeting	no later than 2.5 years
Preliminary Exam	4 years
Final Oral Exam	5 - 6 years

Students who first obtain a M.S. degree at Iowa State prior to beginning the Ph.D. program:

Event	Time since entry
Ph.D. Program of Study Meeting	Within one semester following M.S. degree
Preliminary Exam	Within 2 years of M.S. degree
Final Exam	2 - 2.5 years of M.S. degree

2.7.2 Satisfactory Coursework Progress and Performance

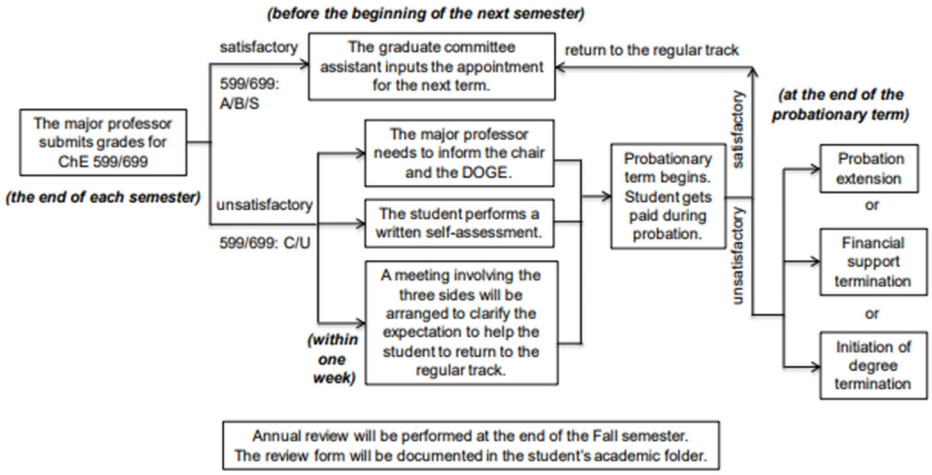
Graduate students are required to maintain a cumulative GPA of 3.00 to be in good academic standing. Students whose GPAs fall below 3.0 will be on probation the following semester. New students whose GPAs fall below a 3.0 will be given a warning the following semester and placed on probation the semester after if their GPA is still below a 3.0. Furthermore, if a student flagrantly neglects coursework or assistantship duties, thereby violating terms of the assistantship contract, the department can suspend a student's assistantship for the following semester.

Students not showing satisfactory progress and failing to bring their GPA above 3.0 at the end of the semester that they are on probation will be terminated and they may be dropped from the departmental graduate program. The student's major professor may petition the departmental committee to allow the student to continue working towards a degree. In this case, the student will

no longer receive an assistantship unless the major professor decides to provide full or partial funding.

2.7.3 Satisfactory Research Progress and Performance

CBE department practice is oriented to ensure graduate student success. We invite feedback as to how we can continue to improve in this regard. However, the path to success can have periods of unsatisfactory progress; this section outlines the process for identifying and resolving such periods. The following policy is applied to both CBE students and the students from other programs with CBE listed as the home department. The purpose of having a clearly written policy is motivated by the lack of consistent signal paths in the past in the situation that a student continuously makes unsatisfactory progress. It also describes an official procedure for a student on a probationary period to return to the satisfactory status so students can make sufficient efforts to achieve this goal.



1. At the end of the Fall semester, the major professor must perform an official annual review with each student and the “Graduate Student Annual Performance Review” form will be documented in the student’s academic folder. Faculty can initiate additional review during an academic year to document unsatisfactory progress. Students have the right to request mediation with the chair and the DOGE at any time.

2. At the end of each semester (Spring, Summer, and Fall), each professor needs to submit students’ grades for 599/699. In majority of the cases, a student who has made satisfactory progress will get a grade of “A”, “B”, or “satisfactory”. The major professor can assign “C” or “unsatisfactory” to the student who did not make satisfactory progress in research. If an unsatisfactory grade is to be assigned, the major professor must document a face-to-face meeting with the student using the “Graduate Student Annual Performance review” form. The form must summarize the deficiencies leading to unsatisfactory status.

3. When ‘unsatisfactory progress’ is documented, the following term becomes a probationary term. The student needs to perform a written self-assessment within one week of the signature date on the “Graduate Student Annual Performance Review.” The major professor needs to inform the department chair and the DOGE about the student’s probationary term immediately after assigning a non-satisfactory grade to 599/699. A meeting involving the major professor, the student, and the chair/DOGE will be arranged to clarify the expectation for the student to return to satisfactory status, which will be included in the documentation.

4. Returning to satisfactory status is required for taking further steps in pursuit of the degree. The graduate program assistant will verify the status and inform both the professor and the student before allowing the student to take POS meeting, prelim, and the final defense.

5. Students will continue to be paid during the probationary semester. No later than two weeks prior to the end of the probationary term, the major professor must submit a memo to the DOGE and Chair requesting to return the student to satisfactory status, extend the probationary period, terminate funding (tuition and/or stipend support), or initiate degree termination for the next semester. If the memo does not request a return to satisfactory status, a meeting will be scheduled involving the major professor, the student, and the Chair/DOGE.

Cases of academic or research misconduct would likely be addressed through the judicial system. These and other types of misconduct are detailed in Chapter 9 of the Graduate College Handbook, https://www.grad-college.iastate.edu/handbook/, and are in a different category than Unsatisfactory Progress; but cases of unsatisfactory grades are addressed there also. Termination of graduate study is addressed in this same section under “Dismissal” where the procedure and student safeguards are addressed.

2.8 Absences from Campus and Travel Procedures

2.8.1 Absences from Campus

A student's major professor must approve absences (other than university holidays) in advance. Graduate students completing a CTE must inform the professor they are working with any absence. In order to approve an absence, students must complete the Personal Travel Notification form. This form will need to be signed by the graduate student traveling, their major professor, and their supervising instructor (if completing CTE). The form should be emailed to the Program Assistant for Graduate Students at least two weeks prior to travel.

2.8.2 Travel Procedures

For students planning to attend a conference, some (if not all) of the following information will apply to you, so please read carefully.

Procedures for attending a conference are:

1. Check with your major professor regarding the conference you wish to attend. Obtain their approval before proceeding with the next step.

2. Complete a CBE Out-of-State Travel Authorization form (available online at www.cbe.iastate.edu/current-students/forms), providing the account number to be used to order your airline ticket. After you sign the form, have your major professor sign and turn in the completed Out-of-State Travel Authorization form to the Administrative Specialist in 2114 Sweeney Hall.

3. There are two options for obtaining flights:
   a. Designated department travel coordinators (Elaine Smuck and Michelle Stotts) have P-cards with designated travel indicator status that must be used to reserve flights through ISU designated vendors. Individuals may search flight options by going to https://www.concursolutions.com/ and establishing a personal profile. All airline options

are available for comparison. Once selected, the preferred flight may be sent to the department travel coordinators.

b. Travelers still have the option to search, book, and pay for their own travel and then be reimbursed after the travel. Travelers should also be aware that when purchasing tickets with a personal credit card the traveler assumes all risk. If the trip is canceled, ISU will not reimburse the traveler for the ticket of a trip that was not taken, as the credit for the unused ticket goes back to the traveler's credit card. By contrast, trips arranged through our contracted travel agency and subsequently canceled can have credits applied to the future trips of any ISU traveler, which ensures the value of the ticket will not be lost. http://www.controller.iastate.edu/travelinformation/internettravelsites.htm

4. Remember to book your other travel needs such as hotel, rental car, shuttle, etc.

5. After travel has occurred, submit a Travel Reimbursement Form https://www.cbe.iastate.edu/files/2015/11/COE-Travel-Reimbursement-Form-Updated-Nov-2015.xlsx and associated receipts to the Administrative Specialist in 2114 Sweeney Hall. For a list of allowable travel expenses see http://www.controller.iastate.edu/travelinformation/allowableexpenses.htm.

2.8.3 Professional Advancement Grants (PAGs)

Professional Advancement Grant (PAG) policies and procedures can be found at https://www.gpss.iastate.edu/pag. PAGs are provided to current graduate students by lowering barriers to attending professional meetings and conferences by helping to defray costs.

Interested graduate students must complete the online form to request funding from the Graduate and Professional Student Senate to help support trip expenses. Any graduate student, who is currently enrolled as a full-time student and is not classified under “continuous registration” may apply for a Travel PAG. Each student is eligible to receive one Travel PAG per fiscal year (July 1 through June 30). All graduate students are eligible for up to $200 per fiscal year from the Graduate and Professional Student Senate (GPSS).

Requests for Travel PAGS can sometimes exceed available funds, so students should apply as early as possible, preferably 8-10 weeks prior to departure. The application must be received in the Graduate College no later than two weeks prior to departure. If you have any questions, please ask or view the PAG website at https://www.gpss.iastate.edu/pag.

PAG funds must be expended by one month after the last day of the conference. Not taking action within one month constitutes forfeiture of funds and the funds will revert back to use for new travel grant awardees. If a student is funded to attend a conference and does not attend, the student must notify the GPSS PAG Chair in writing to cancel their PAG by emailing gpsspag@iastate.edu. This must be done no later than 2 weeks after the conference.

2.8.4 CBE Travel Grant

The Department of Chemical & Biological Engineering offers travel grants to help defray expenses for professional meetings and conferences for Chemical & Biological Engineering students. Amount of support is limited to one award per fiscal year (July 1 – June 30). To apply for the grant, complete the form at https://www.cbe.iastate.edu/files/2020/02/CBE-Travel-Grants_02032020.pdf and forward the form to the Administrative Specialist in 2114 Sweeney Hall.

2.9 Facilities

2.9.1 Office and Building Hours

The CBE main office, 2114 Sweeney Hall, is open from 8 a.m. to 5 p.m. The telephone number is 515-294-7642. The fax number is 515-294-2689. Administrative offices on campus are also open during these hours. Summer and break hours change to 7:30 a.m. to 4 p.m.

Sweeney Hall hours are:

Monday – Friday: 6:00 am – 8:00 pm
Saturday – Sunday: Closed

The northwest door of Sweeney Hall is equipped with a card reader to allow access to Sweeney Hall outside of the above listed hours. Sweeney Hall is closed during University Holidays.

Biorenewables Research Laboratory hours during the fall and spring semesters are:

Monday – Friday: 8:00 am – 5:00 pm
Saturday – Sunday: Closed

Biorenewables Research Laboratory hours during the summer semesters and semester breaks are:

Monday – Friday: 7:30 am – 4:00 pm
Saturday – Sunday: Closed

Biorenewables Research Laboratory is closed during University Holidays.

2.9.2 Office Assignments

Office and laboratory spaces are available for each graduate student. Students are assigned an office space by the department chair and the operations manager. Key request forms can be obtained from the main office, in 2114 Sweeney Hall. The supervisor will need to complete and sign the form. The form will need to be returned to the main office for the key to be ordered. The following day a key issue form can be taken to the General Services Building where keys are issued with an I.D. Graduate students needing to switch keys with another graduate student must stop in 2114 Sweeney Hall and request that a Transfer of Keys be entered online. Lost or stolen keys will be replaced for a $30 fee each, in addition to any fees associated with rekeying.

Each graduate student is responsible for maintaining a neat and safe environment in the assigned office and laboratory. Safety inspections occur frequently. All offices are initially equipped with a desk, chair, and desktop computer.

2.9.3 Office Supplies

Graduate students are responsible for their own office supplies. There are often old file folders available for student use from the main office if needed (see the Administrative Specialist in 2114 Sweeney).

2.9.4 Printing

The copy machines and printers in 2123 Sweeney Hall may be used for research-related material and material approved by your major professor. Departmental printers and copiers should not be used for personal use. The copiers at the Library may be used for personal copying.

2.9.5 Mail

Graduate students have mailboxes in 2112 Sweeney. Students should check their mailbox regularly for department announcements. Campus mail can be mailed from that room also. Personal mail should not be delivered to or sent from the department office.

2.9.6 Sweeney Graduate Student Lounge

The graduate student lounge is in 1021 Sweeney. It is equipped with a microwave, refrigerator, coffeemaker, table, and chairs. This room will be available to graduate students only for eating meals and for interaction among students. CEGSO announcements and other related information will be posted in this lounge. Each graduate student will be provided with a key to the graduate student lounge. Graduate students are responsible for disposing of their own expired items in the refrigerator and for cleaning up messes in the lounge.

There are also undergraduate/graduate student study rooms available in Sweeney 2123 and 3149 Sweeney.

2.9.7 Room Reservation Requests

Room requests for the conference rooms in Sweeney Hall (in rooms 2041, 2126, 3041, and 3149) can be made by contacting the Administrative Specialist in the main office (2114 Sweeney). Requests to reserve any classroom spaced in Sweeney Hall or in the Biorenewables Research Complex must be made through Iowa State's Room Scheduling process.

2.9.8 Checkout Procedures

Each graduate student must arrange a checkout procedure with their research group when leaving the department. Students employed by other centers, institutes, or laboratories within the university must also comply with their outlined checkout procedures.

The departmental checkout procedure is outlined on the CBE Graduate Student Checkout Form (see Appendix E). The exit survey for all graduating CBE students must be completed prior to the Director of Graduate Education (DOGE) signing the Graduate Student Approval form. All items on the checkout form must be completed prior to students receiving their thesis/dissertation copies.

3. Professional Development Opportunities on Campus

The Department and University provide a variety of opportunities for graduate students to develop their academic, research, and professional skills. In addition to considering the opportunities and resources listed below, students are also encouraged to discuss with their major professor(s) opportunities for professional development on and off campus.

3.1 Chemical Engineering Graduate Student Organization

The Ch E Graduate Student Organization (CEGSO) was founded to promote interaction among the graduate students of the department. The organization not only works to achieve a pleasant work environment, but also strives to promote awareness of more global concerns. CEGSO sponsors social events and lectures that address topics outside the field of Ch E and encourage open discussion.

Past CEGSO events have included activities such as picnics, potluck dinners, canoeing, and sports teams. CEGSO members show prospective graduate students around the campus and city during visits. Members also help incoming graduate students with problems such as getting to Ames from the airport and where to live. CEGSO membership is currently limited to Ch E graduate students, although members are encouraged to bring guests to the functions. To become a member of CEGSO, simply pay your dues at the beginning of each semester. An announcement will be made as to when and where the money should be paid. CEGSO officer elections occur at the beginning of fall semesters.

The CEGSO web page includes student and group profiles, honors/awards, and updates current happenings in the department concerning graduate students
https://www.facebook.com/groups/1654456971504721/

2020-2021 CEGSO Cabinet

President	Geet Gupta
Vice President	Daniel Sahayaraj
Treasurer	Elizabeth Grego
Secretary	Lilly Synan
Faculty Adviser	Jean-Philippe Tessonnier

3.2 Ch E 601: Seminar

Ch E 601: Seminar, offered every fall and spring semester, is a required course for all graduate students in the department. Seminar is a once a week, 50 minute course during which guest presenters from academia and industry lecture about their expertise and research in the Ch E field. Ch E 601 provides an opportunity for students to hear about current research and practices in the Ch E field and to network with colleagues and experts in Ch E. CEGSO also hosts a meet and greet with the guest presenters during the 30 minutes prior to the seminar course.

Participation and attendance at Ch E 601 is required, unless an exception is approved by the DOGE.

3.3 CBE Perfect Pitch Competition

Each spring semester, as a part of the Seminar course, graduate students participate in the Department's Perfect Pitch Competition. This competition involves having students answering the following questions about their research in a timed format:

- What is the need of your research?
- How does your approach uniquely solve the problem?
- What is the potential impact if your research is successful?

The competition provides the opportunity for students to hear about their peers' research and to practice articulating their own research problem and approach to an audience of both Ch E and non-Ch E professionals. The format of the competition alternates every other year, with either students who have completed their qualifier presenting in a 90-second time frame or students who have completed their preliminary exam presenting in a 3-minute time frame. Cash prizes are awarded to first, second, and third prize winners, as determined by a group of judges.

3.4 Outstanding Research and Teaching Awards

The Graduate College and the Department of Chemical and Biological Engineering sponsor two awards to graduate students for outstanding achievement in research and teaching.

3.4.1 Research Excellence Award

The Research Excellence Award is awarded to one graduate student per fall and spring semester to recognize outstanding research accomplishments, as documented in resulting theses and dissertations. Recipients are also expected to be academically superior and able to not only do research, but also develop a well-written product. The award is administered by the Graduate College with additional administrative support from the Graduate Student Senate.

Each Research Excellence Award recipient will receive a letter of commendation from the Iowa State University president, a certificate of achievement from the dean of the Graduate College, and an honor cord for commencement. Recipients will be recognized in the Iowa State University Commencement Program and a notation of the award will be made on their transcript.

3.4.2 Teaching Excellence Award

The Teaching Excellence Award is awarded to one graduate student per fall and spring semester to recognize outstanding achievement in teaching. The program is administered by the Graduate College with additional support from the Graduate Student Senate.

Each Teaching Excellence Award recipient will receive a letter of commendation from the Iowa State president, a certificate of achievement from the dean of the Graduate College, and an honor cord for commencement. Recipients will be recognized in the Iowa State University Commencement Program and a notation of the award will be made on their transcript.

3.5 Graduate Student Professional Development Resources

Although not an exhaustive list, the Graduate College provides the following opportunities and resources for all graduate students on campus. All graduate students are encouraged to utilize these resources, as needed.

Career Services https://www.grad-college.iastate.edu/career/
Provides individual consultations, workshops, and presentations for graduate students and postdoctoral scholars to support career exploration and searches. Graduate students are also able to work with the College of Engineering's Career Services office (http://www.engineering.iastate.edu/ecs/).

Center for Communication Excellence https://cce.grad-college.iastate.edu/
Provides feedback on written and oral communications to graduate students and postdoctoral scholars through programs in mentoring, peer review, thesis/dissertation consultations, and more.

Center for Excellence in Learning and Teaching (CELT) https://www.celt.iastate.edu/graduate-students-postdocs/
Provides resources for graduate students with current teaching responsibilities at the University. CELT also provides opportunities for professional development for students interested in a future career in teaching including the Graduate Student Teaching Certificate and the Preparing Future Faculty program.

Graduate and Professional Student Senate (GPSS) https://www.gpss.iastate.edu/
An elected group of graduate and professional students that serve as a liaison between students and the University to promote ideas and programs that support graduate and professional student welfare. The department has a GPSS representative. If you are interested in representing the department on the GPSS, please reach out to the Program Assistant for Graduate Students.

4. Purchasing Policies and Procedures

Graduate students are able to purchase supplies needed for their research laboratories in cyBUY, or by using an issued purchasing credit card (P-card) or purchase order requisition.

4.1 cyBUY

When purchasing supplies, students should first check the cyBUY website for item availability. cyBUY was designed to allow for purchasing supplies from University contracted vendors as well as Chemistry Stores and Central Stores. cyBUY can be accessed in Workday. Instructions on how to purchase supplies through cyBUY can be found on the Workday: WorkCyte page in the Self Service: Job Aids section of the website. The appropriate Job Aid is titled “Creating an Order From a cyBUY Supplier for Departments.”

4.2 Purchasing Credit Card (P-card)

A P-card is a VISA credit card available to faculty and staff for purchasing low-dollar (purchases under $4,900) and tax free supplies. Students who are interested in obtaining a P-card for purchasing should speak with their major professor. Cardholders are required to complete the Iowa State University p-card program online application and attend an orientation session to obtain a p-card. Cardholders will be provided with specific information needed to activate their corporate card during cardholder orientation. Cardholders may enroll in Procurement Card Orientation sessions through Learn@ISU. P-card applications may be submitted by the applicant through the Create Request task in Workday (see https://www.procurement.iastate.edu/card-services/procurement-card/how).
•Navigate to the task by searching Create Request from the Workday Landing Page.
•Search ‘card’ in the Request Type box, press enter, and select Card Application – Procurement Card(p-card).

Students assigned a P-card are responsible for their card until they leave the department. Only the person who was issued the P-card should use the P-card to purchase supplies.

Purchases should be tax exempt. When purchasing an item, tell the vendor that you are from Iowa State University, and you will be making a Visa purchase. EMPHASIZE THAT THE UNIVERSITY IS SALES TAX EXEMPT! If the supplier requests the University's sales tax-exempt number, please provide the appropriate number: Sales Tax:1-85000775M. If the supplier requests a University sales tax exempt certificate, request a form at https://www.procurement.iastate.edu/resources/salestax/tax-exempt-form .

After obtaining a P-card and making a purchase, the cardholder is required to verify the purchase in Workday. Once a purchase has been made, the purchaser will receive an email from a Procurement and Expense Specialist. To verify the purchase, students should reply to this email and include the following information in the email:

· Business purpose for the purchase (identify who, what, where, when, and why)
· Receipts (attached to the email)
· Appropriate Worktag for the purchase
· Appropriate Spend Category for the purchase

The Procurement and Expense Specialist will then work to verify the purchase based on the information included above. All purchases should be verified by the 30 day deadline. If purchases are not verified, the cost of the item purchased will be charged to the purchaser's UBill. Questions regarding the appropriate Worktag and Spend Category for purchases should be directed to the major professor.

Cardholders are required to keep the original receipt for one year after the purchase date.

For more information on the Purchasing Card guidelines, please see https://www.procurement.iastate.edu/sites/default/files/Documents/pcard_ch_guide2020-09%20with%20graphics.pdf

4.3 Purchase Order Requisitions

A purchase requisition is used to request equipment, supplies or services for purchases over $4,900 or when a company will not accept a credit card as a form of payment. Graduate students will need to obtain a quote from the company to upload into Workday. Students will also need to provide a short justification as to why the purchase is being made and the Worktag that will be charged for the purchase. This request will then be routed for approval.
These are standard questions any department should ask when buying new equipment:

1. Will it fit through a standard door?
2. Does it require building service connection that is not readily available? (heat, air, water, etc.)
3. Does it require special equipment to be moved?
4. Is the right power available?
5. Is it replacing in-kind equipment?

5. Departmental Directory

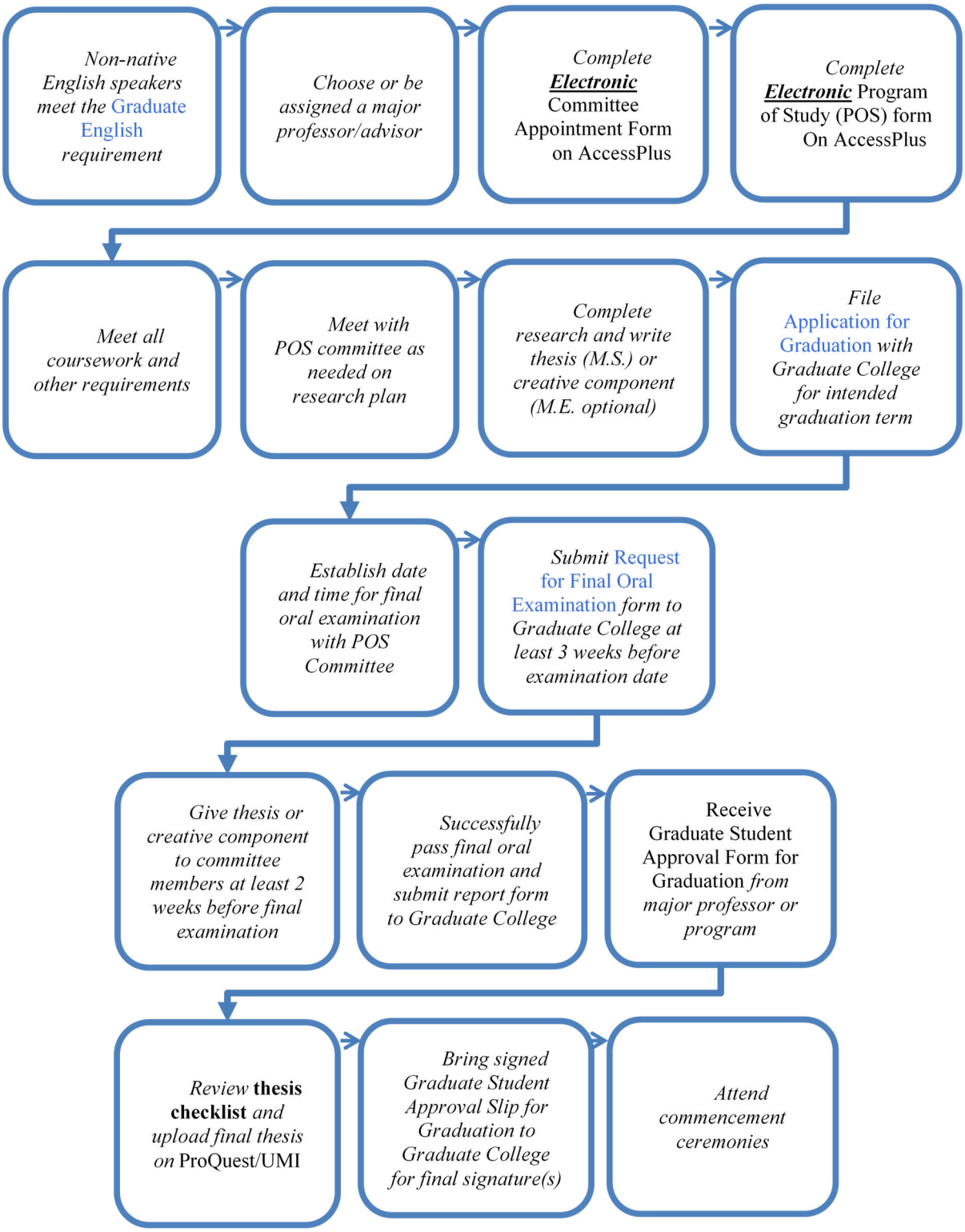
Faculty				
Name	**Title**	**Address**	**Phone**	**E-mail**
Rizia Bardhan	Associate Professor	5005 ATRB	4-5138	rbardhan@iastate.edu
Kaitlin Bratlie	Associate Professor	2220 Hoover	4-7304	kbratlie@iastate.edu
Eric Cochran	Professor	3133 Sweeney	4-0625	ecochran@iastate.edu
Rodney Fox	Distinguished Professor	3162 Sweeney	4-9104	rofox@iastate.edu
Kurt Hebert	Professor	3155 Sweeney	4-6763	krhebert@iastate.edu
Andrew Hillier	Professor & Department Chair	2114 Sweeney	4-3678	hillier@iastate.edu

Laura Jarboe	Professor	4134 BRL	4-2319	ljarboe@iastate.edu
Monica Lamm	Associate Professor	2157 Sweeney	4-6533	mhlamm@iastate.edu
Wenzhen Li	Associate Professor	2140 BRL	4-4582	wzli@iastate.edu
Surya Mallapragada	Distinguished Professor	5023 ATRB	4-7407	suryakm@iastate.edu
Thomas Mansell	Assistant Professor	4136 BRL	4-7177	mansell@iastate.edu
Balaji Narasimhan	Distinguished Professor	5001 ATRB	4-8019	nbalaji@iastate.edu
Matthew Panthani	Associate Professor	2037 Sweeney	4-1736	panthani@iastate.edu
Tanya Prozorov	Adjunct Assistant Professor	332 Wilhelm	4-3376	tprozoro@iastate.edu
Nigel Reuel	Assistant Professor	3051 Sweeney	4-4592	reuel@iastate.edu
Lanny Robbins	Distinguished Faculty Fellow	2159 Sweeney		lrobbins@iastate.edu
Luke Roling	Assistant Professor	3053 Sweeney	4-4959	roling@iastate.edu
Derrek Rollins	University Professor	1033 Sweeney	4-5516	drollins@iastate.edu
Ian Schneider	Associate Professor	2035 Sweeney	4-0450	ians@iastate.edu
Brent Shanks	Distinguished Professor	1140L BRL	4-1895	bshanks@iastate.edu
Jacqueline Shanks	Professor	3031 Sweeney	4-4828	jshanks@iastate.edu
Zengyi Shao	Associate Professor	4140 BRL	4-1132	zyshao@iastate.edu
Jean-Philippe Tessonnier	Associate Professor	2138 BRL	4-4595	tesso@iastate.edu
Dennis Vigil	Professor	3037 Sweeney	4-6438	vigil@iastate.edu
Qun Wang	Adjunct Assistant Professor	1014 Sweeney	4-4218	qunwang@iastate.edu
Yue Wu	Professor	2033 Sweeney	4-0702	yuewu@iastate.edu
Lecturers				
Name	**Title**	**Address**	**Phone**	**E-mail**
Karen J. Burt	Assistant Teaching Professor	3035 Sweeney	4-7195	kjburt@iastate.edu
Jennifer Heinen	Teaching Professor	3033 Sweeney	4-1891	jmheinen@iastate.edu
John Kaiser	Professor of Practice	2117 Sweeney	4-8575	jkaiser@iastate.edu
Stephanie Loveland	Teaching Professor	3055Sweeney	4-3024	prairie@iastate.edu
T.J. Paskach	Professor of Practice	3063 Sweeney	4-5825	tpaskach@iastate.edu

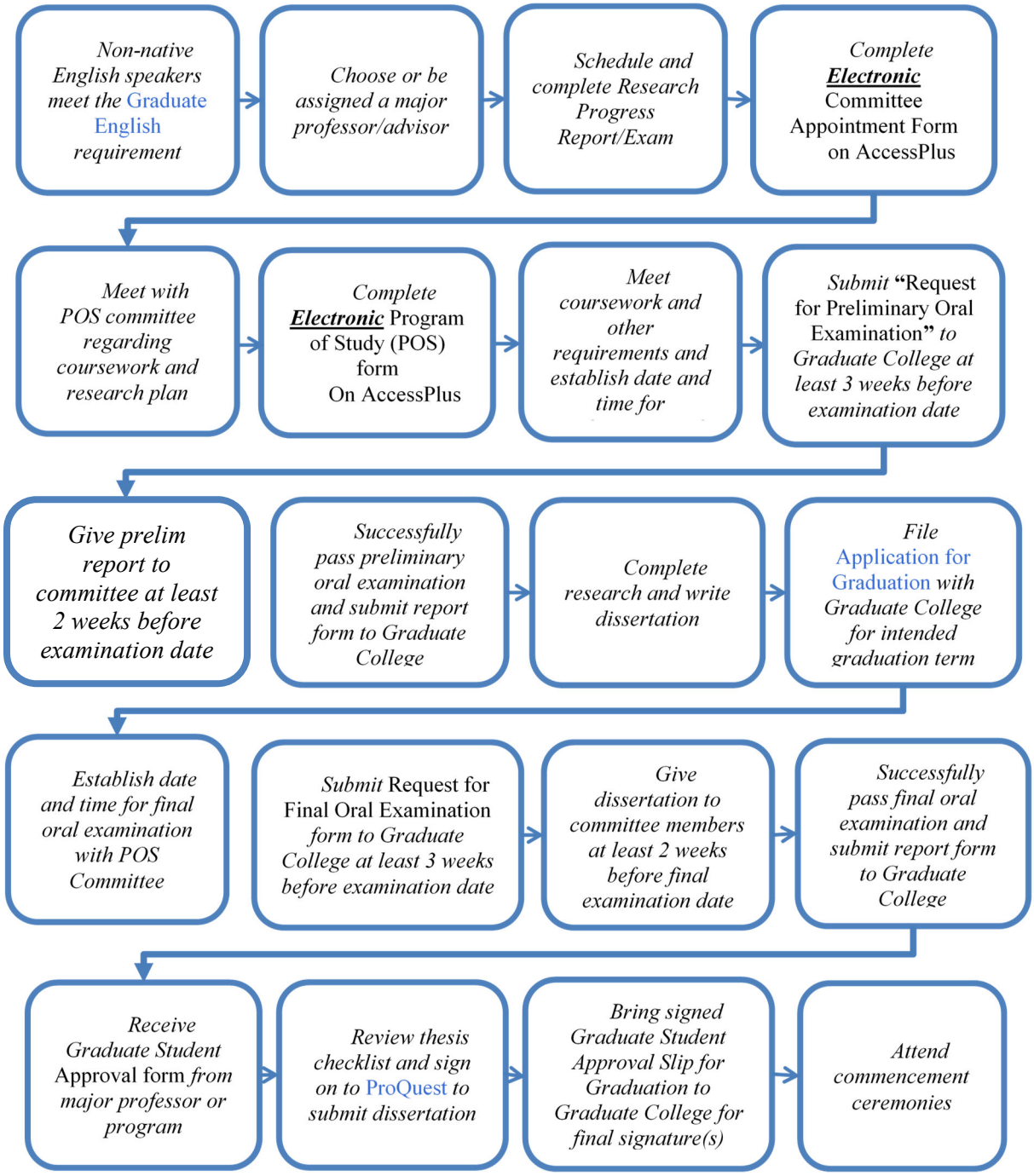
Courtesy Appointments				
Name	**Title**	**Address**	**Phone**	**E-mail**
Mufit Akinc	Professor	2240L Hoover	4-0738	makinc@iastate.edu
Robert Brown	Distinguished Professor	1140E BRL	4-7934	rcbrown@iastate.edu
Liang Dong	Professor	2115 Coover	4-0388	ldong@iastate.edu
Ted Heindel	University Professor	2018 Black Engr	4-0057	theindel@iastate.edu
Duane Johnson	Professor	311 TASF	4-9649	ddj@iastate.edu
Michael Olson	Professor	3025 Black Engr	4-0073	mgolsen@iastate.edu
Alberto Passalacqua	Associate Professor	302 Lab of Mechanics	4-5047	albertop@iastate.edu
Staff				
Name	**Title**	**Address**	**Phone**	**E-mail**
Ryan Arndorfer	Laboratory Supervisor	2052 Sweeney	4-1660	rja@iastate.edu
Sarah Beckman	Laboratory Supervisor	2054 Sweeney	4-4134	sezb@iastate.edu
Matthew Brown	Student Services Specialist	2162 Sweeney	4-9124	mrb@iastate.edu
John Burnett-Larkins	Communications Specialist (1/2 FTE, CoE)	1300E Marston	4-5493	johnbl@iastate.edu
Kelsey Polaski	Graduate Students & Data Analytics Specialist	2114 Sweeney	4-7870	kpolaski@iastate.edu
Nicole Prentice	Academic Adviser	2162 Sweeney	4-2127	nprent@iastate.edu
Colin Richey	Systems Analyst	1144 Sweeney	4-4919	crichey@iastate.edu
Mackenzie Schwartz	Academic Adviser	2162 Sweeney	4-3960	mjs18@iastate.edu
Elaine Smuck	Event and Business Coordinator	2114 Sweeney	4-7642	esmuck@iastate.edu
Michelle Stotts	Operations Manager	2114 Sweeney	4-9297	mlstott@iastate.edu

Appendix A

Procedures for Earning a Master's Degree (M.Engr. or M.S.)



Appendix B
Procedures for Earning a Ph.D. Degree



Appendix C
Research Rubric

Criteria	Exemplary (4 - 5)	Good (2 - 3)	Needs Improvement (0 - 1)
Understanding and defining the problem	Clearly defines the problem. Outlines necessary objectives in an efficient manner. Places problem within context of previous knowledge and what is not known about the problem.	Formulates a clear and specific problem statement. Does not gather extensive information.	Offers ambiguous definition and interprets problem narrowly. Does not seek sources of information.
Understanding of fundamentals related to the problem	Show good understanding of fundamental principles of phenomena being studied.	Have trouble connecting knowledge of fundamental principles to problem being studied.	Fails to show good understanding of fundamental principles.
Use and integration of information	Throughout the process, demonstrates the ability to gather and use a broad spectrum of resources and information. Integrates information with knowledge and research strategies. Applies and integrates previous knowledge to current problem.	Identifies and finds resources to help solve problem and can interpret information. May have difficulty using information effectively in research. Does not consistently gather extensive information and/or use it to solve the current problem.	Fails to see relevance of gathering information. Obtains information from limited or inappropriate sources. Expects others to make connections between information gathered and the problem.
Designing and Conducting Experiments			
Design	Able to develop and describe planned experiments that relate to the research problem. Hypotheses clearly relate to previous knowledge. Can identify necessary steps and timeline.	Formulates a hypothesis and develops a project, experiment, or series of experiments that will address the problem. Anticipates possible outcomes.	Fails to formulate hypothesis to test. Does not express possible outcomes.
Use of evidence	Continuously uses results to refine research plan. Draws correct conclusions from results and generates presentation information (e.g., plots, tables,) that consistently aid understanding of the problem. Explores new ways of doing tasks.	Adjusts experimental plan on basis of new knowledge. Usually, plots/tabulates results and performs calculations to aid reaching conclusions.	Does not base conclusions on evidence. Calculations contain errors.

Analyzing, Interpreting, and Communicating Results			
Use of analytic tools	Demonstrates ability to successfully use new analytical tools and procedures. Can describe the rationale for these processes.	Attempts to use analytical tools (e.g., statistics) in relation to the research process. May not be successful.	Does not evaluate sources of error. No replicates or control experiments are performed.
Interpretation of data	Relates solution to theory and research. Able to describe conclusions in a clear and concise manner using own results and those cited in the literature. Contrasts results with those expected from hypotheses.	Interprets results and draws conclusions based on the data.	States conclusions without justification. “Hopes” the answer is correct. Does not consider internal consistency of results. Does not link cause and effect based on data.
Analyzing alternative interpretations and solutions	Proposes limitations and alternative interpretations. Able to account for unexplained results.	Uses information gathered to refine original problem.	Fails to look at solution relative to the original question.
Models	Develops original and groundbreaking conceptual and/or mathematical models. Uses model to explain results which cannot be reconciled with other models.	Extends, refines, or falsifies known theory and/or models.	Does not consider implications for models or theory.
Oral Communication	**Exemplary (4 - 5)**	**Good (2 - 3)**	**Needs Improvement (0 - 1)**
Organization	Presentation is clear and logical. Listener can easily follow line of reasoning.	Presentation is generally clear. A few minor points may be confusing.	Presentation is very confused and unclear. Listeners cannot follow it.
Content	Information given is consistently accurate and clear. Implications of results and “where do we go from here” discussed.	Description of project and results is generally clear. No significant errors are made. Listeners recognize errors as result of oversight or nervousness. Some discussion of what results mean.	Description of project and results is very difficult to follow. No discussion of meaning of results. Inaccurate information provided.
Use of visual aids	Aids prepared in professional manner. Font is large enough to be seen by all. Well organized. Main points stand out.	Aids contribute, but not all material supported by aids. Font size is appropriate for reading.	Aids are poorly prepared or used inappropriately. Font is too small. Too much information is included.
Responsiveness to audience	Responds well to questions. Restates and summarizes when needed.	Generally responsive to questions.	Reluctantly interacts with audience or avoids audience interaction. Responds poorly to questions.

Written Report			
Introduction and background	Discusses rationale for project. Presents background information, with references, relevant to the study. List of complete citations in appropriate style at end.	Gives general description of the purpose of the study, but some relevant background information may be missing. Some references may be incomplete/in incorrect style.	Provides little or no information on why the study was done. No background information given. Few or no references are given. Style is incorrect and/or incomplete.
Methods and results	Concisely describes methods and presents results in tables or figures.	Methods insufficiently described. Some results presented, but may be incomplete.	Most key pieces of information are missing. Insufficient results are presented, or several errors in calculations are present.
Discussion	Clearly discusses what results mean and what conclusions may be drawn from them. Cites published standards or other related reports.	Generally clear discussion of results and conclusions, but may miss some points. Some use of references and published standards.	Reader can gain very little information about why the project was done and what the results may mean. No reference to other studies.
Style	Writing is free of errors in grammar, punctuation, capitalization, and spelling. Flows smoothly. Logical connection of points. Follows standard organizational style.	Writing is generally error-free. Sentence flow is generally smooth and logical. Standard style is generally followed. Minor errors may be present.	Errors are frequent and distracting, so that it is hard to determine meaning. No logical connection of ideas or flow of sentences. Voice may change randomly. Journal paper style is not followed.
Overall Assessment	Clearly and concisely articulates the research process and applies it to current problem.	Understands the research process, but it does not apply to .current problem.	Goes through the motions of solving the problem with no real understanding of the process involved.

Appendix D

Welcome CBE Graduate Students!

Please use the following checklist to help prepare for your transition to Iowa State University as a graduate student in the Department of Chemical & Biological Engineering. If you have any questions, please contact chemengr@iastate.edu.

Before Arriving in Ames:

☐ Register your Net ID and sign in to your ISU CyMail email account

To create your Net ID, go to the university's ASW webpage and click on the "Need to register for a Net-ID?" link to register. Once you create a Net ID, you will be able to log in to your CyMail email account. If you have previously been a student or REU participant at ISU, you do not need to create a new Net ID. Once you have created your Net ID, please email this to chemengr@iastate.edu.

☐ Send any final undergraduate or graduate transcripts to the ISU Office of Admissions

☐ Register for Fall 2020 courses

Guidelines on how to register for classes in AccessPlus can be found in this video. As a graduate student, you do not need to use a Registration Access Number (RAN) to use the registration system. You should register for the following courses: Ch E 545, Ch E 554, CH E 583, Ch E 601, Ch E 698A (11 credits). If you have taken graduate level Ch E courses previously, we will look to adjust your registration per the outcome of the next checkbox item.

☐ For any graduate level coursework you would like to have evaluated to transfer to ISU, complete a Graduate Student Transfer Credit Worksheet

The form can be found in the Graduate Student Forms column on CBE's Forms webpage. Send all Graduate Student Transfer Credit Worksheets to chemengr@iastate.edu. Please note the instructions and eligibility requirements at the top of the worksheet.

☐ *(International students only)* Complete the ISSO International Student Online Orientation

You will receive an email invitation to complete this step once you register your Net-ID. The ISSO Online Orientation Course will be completed on Canvas (ISU's online course management system).

☐ *(International students only)* Sign up for your Graduate Check-in

To register for the ISSO Graduate Check-in, please follow the instructions on ISSO's New Student Orientation website.

☐ *(International students only)* Register for the English Placement Test (EPT) and Oral English Certification Test (OECT)

Please see the EPT information page and the OECT information page for information regarding test content, registration, and potential exemptions. Note that registration for these tests may not open until 2 weeks prior to the test date.

☐ Register for required Laboratory Safety courses

Register for the required courses through Learn@ISU. Please complete the following trainings: Laboratory Safety Orientation, Laboratory Safety: Chemical Storage, Laboratory Safety: Core Concepts, Laboratory Safety: Compressed Gas Cylinders, Laboratory Safety: Fume Hoods, Laboratory Safety: Spill Procedures, Fire Safety and Fire Extinguisher Training, and Worker Right-to-Know OSHA Hazard Communication Standard Training. All online trainings may be completed before arriving on campus, but the instructor-led Laboratory Safety Orientation will be completed in-person in August the week prior to courses. Registration for this training is not currently open, but is anticipated to be open by July. I encourage you to register as soon as possible, as seats may fill quickly.

☐ Sign your Letter of Intent (LOI)

Prior to the beginning of the fall term, you will be prompted to electronically sign a LOI for your graduate research assistantship position.

After Arriving in Ames:

- [ ] *(International students only)* Attend required ISSO Graduate Check-in and take the EPT and OECT
- [ ] Check-in with Department to complete a key request

Email chemengr@iastate.edu when you arrive in Ames to schedule a time to check-in.

- [ ] Complete online onboarding through Workday

Follow the steps indicated on your onboarding page in Workday including signing up for University payroll, student and scholar health insurance, direct deposit, and other employee actions.

- [ ] Get your ISU ID card in 0530 Beardshear Hall
- [ ] Attend Laboratory Safety Orientation and complete online safety trainings not already completed
- [ ] Attend required and optional orientation events
  - *(required for all students)* CBE New Graduate Student Orientation
  - *(optional, but encouraged for all)* GPSS and Graduate College New Graduate Student Orientation

Appendix E

Please complete, sign, and return this checkout form to the Graduate Adviser in Sweeney 2114.

All items on this form must be completed and this form must be turned in prior to receiving your thesis/dissertation copies and CBE padfolio.

CBE Graduate Student Checkout Form

☐ Return any University Library materials you have checked out.

☐ If you are supported by Ames Lab (or have been in the past), checkout with their Human Resources Office in 105 TASF.

☐ Arrange a checkout procedure with your major professor and research group. All personal items must be removed from your office space and your desk key should be placed in the lock. If anything is left behind, it will be disposed.

☐ Ensure that your lab space is clean and all waste chemicals are appropriately disposed.

☐ Return your university keys (office and lab) to the Admin Specialist in 2114 Sweeney or Facilities Planning & Management (108 General Services Building).

☐ If you have a departmental computer, contact the CBE Systems Support Specialist (cbetech@iastate.edu) to return the computer.

☐ If you have a P-card, return your P-Card to the Graduate Coordinator in 2114 Sweeney. Be sure that all outstanding CyBuy or P-card paperwork is submitted.

☐ Send the department your thesis/dissertation for binding after it has been approved by the Graduate College. Send a PDF copy of your thesis/dissertation to chemengr@iastate.edu. The department will cover the cost for binding two copies. Any additional copies you would like can be printed through ISU printing at your cost.

☐ Complete the CBE Graduation Exit Questionnaire through Qualtrics to share with the department your plans. https://iastate.qualtrics.com/jfe/form/SV_a5Umyc4Yn30q789

☐ Inform Engineering Career Services (ecs@iastate.edu) of your employment.

By signing this form, I verify that all of the above items have been completed by the graduating student.

Major Professor: _____ Date: _____

Graduating Student: _____ Date: _____