



## **Graduate Student Handbook**

**2015 - 2016**

***Department of Chemical & Biomolecular Engineering  
University of Tennessee***

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## **Department Head Welcome Statement**

Welcome to the Department of Chemical and Biomolecular Engineering at the University of Tennessee in Knoxville. Currently, our faculty are actively leading research into both traditional chemical and energy industries as well as new areas of application and innovation, such as biotechnology, pharmaceuticals, advanced materials, and sustainable energy.

Our primary mission is to educate leaders and innovators through creation of fundamental knowledge and technologies in the chemical and biomolecular sciences and engineering. The general theme of our program is to foster creativity, to recognize excellence, and to promote a collegial and cohesive research and educational environment while emphasizing the value of diversity.

I encourage you to explore this handbook to learn more about policies and procedures associated with graduate education in our department.

Sincerely,

**Bamin Khomami**  
Department Head

# 1. INTRODUCTION

## ***Introduction from the Graduate School***

In order to serve the mission and vision of the Graduate School and preserve the integrity of Graduate Programs at the University of Tennessee, Knoxville, information related to the process of graduate education in each department is to be provided for all graduate students.

Based on Best Practices offered by the Council of Graduate Schools, it is important that detailed articulation of the information specific to the graduate degrees offered in each department/program be disseminated. The Department Graduate Handbook does not deviate from established Graduate School Policies noted in the Graduate Catalog (<http://catalog.utk.edu/index.php> -- navigate to "Academic Policies and Requirements for Graduate Students"), but rather provides the specific ways in which those policies are carried out.

## ***Purpose of Handbook***

Graduate students are expected to be aware of and satisfy all regulations governing their work and study at the university. Information about these regulations can be found in the Graduate Catalog (<http://catalog.utk.edu/index.php>), the Hilltopics publications (<http://dos.utk.edu/hilltopics/>), and the Graduate Student Appeals Resources web site (<http://gradschool.utk.edu/studappresrce.shtml>).

This handbook sets forth policies and procedures related to graduate education in the Chemical and Biomolecular Engineering Department. If an issue arises that is not explicitly addressed in this document, students are advised to contact their advisor or the Director of Graduate Studies to discuss the situation. Any unaddressed circumstances impacting the awarding of graduate degrees in chemical and biomolecular engineering require the approval of the Director of Graduate Studies, the Department Head, or the thesis committee.

Beyond general information applicable to all graduate students at UTK, the Graduate Catalog is also a valuable resource for understanding CBE degree requirements. To find current information on CBE programs, navigate to the College of Engineering link from the menu on the main landing page and scroll down to the Chemical and Biomolecular Engineering section.

## ***Chemical and Biomolecular Engineering Graduate Administration***

### **Director of Graduate Studies**

Dr. Eric Boder  
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### **Director of Graduate Admissions**

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### **Graduate Program Assistant**

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## ***Graduate Committee and Graduate Admissions Committee***

Dr. Eric Boder  
Dr. Paul Frymier  
Dr. Stephen Paddison  
Dr. S. Michael Kilbey

## ***General Duties and Responsibilities of Faculty and Graduate Students***

Participating faculty and graduate students are expected to fully commit to the departmental graduate program and participate in professional activities. Participation in the graduate seminar series, hosting departmental visitors, and student recruiting are particularly important.

Graduate students and their faculty advisors must satisfy all university regulations in a timely fashion. Students and advisors need to maintain awareness of departmental, college, and university requirements and deadlines for completing the program. Information about these requirements may be found in the Graduate Catalog and the Graduate School web site.

## **2. ADMISSION REQUIREMENTS AND APPLICATION PROCEDURE**

Applications to the graduate program must be submitted through the Office of Graduate Admissions of the Graduate School (<http://graduateadmissions.utk.edu>). University admission requirements are described in the Graduate Catalog. In addition to these requirements, official GRE scores and three letters of recommendation are required for admission. The department-specific application and electronic recommendation letter instructions are provided via the online application at [graduateadmissions.utk.edu](http://graduateadmissions.utk.edu).

## **3. FINANCIAL SUPPORT**

### ***Application for Financial Support***

The application for admission to the graduate program includes an indication by the applicant of whether financial support is requested. In general, applicants to the Ph.D. program will not be admitted without assistantship support barring extenuating circumstances. Departmental assistantships are available for M.S. students only in rare circumstances.

Assistantships may also be available through interdisciplinary programs on campus. These programs may require a separate application directly to the program, and in some cases selected applicants may be nominated for extra-departmental assistantship or fellowship programs by the Graduate Admissions Committee. For more information, contact the Director of Graduate Studies or Graduate Admissions Director.

### ***Graduate Assistantships***

The department offers graduate assistantships (GA), graduate teaching assistantships (GTA), and graduate research assistantships (GRA). GA and GRA appointments are 12 months in duration, and GTA positions are 9 months. Pending continued availability of funds, these positions can be renewed each year for students demonstrating suitable progress toward completion of a thesis and adequately performing duties of the particular position as judged by the advisor/supervisor. Any student determined

to be inadequately performing as judged by the advisor or who fails to maintain good academic standing may have his or her assistantship appointment terminated at any time.

GTA positions in CBE are typically 25% appointments corresponding to ten hours/week of obligation. GTA appointments provide a waiver of university maintenance fees, university health insurance premiums, tuition, and a partial departmental stipend, but no student or activity fees, including fees charged for enrollment in engineering courses. Ph.D. students holding GTA positions typically also receive 25% GRA or GA appointments, corresponding to an additional ten hours/week in performance of GRA or GA duties and providing the remainder of the departmental graduate stipend (but not student or activity fees). Other GRA and GA appointments in CBE are 50% appointments, corresponding to 20 hours/week obligation, providing a waiver of university maintenance fees, university health insurance premiums, tuition, and the full departmental stipend, but not student or activity fees.

Duties of a GTA position commonly include grading and holding office hours. Other duties may be assigned by the faculty supervisor. Duties of the GRA depend on the nature of the funded project, but generally coincide with the thesis or dissertation research.

Students are expected to progress continuously through the graduate program in a timely fashion. To encourage steady progress toward the degree objective, the following limits apply to departmental support:

- Master Degree Candidates: Maximum of two years total support from any source.\*
- Ph.D. Degree Candidates who enter with an M.S. Degree: Maximum of four years total support from any source.\*
- Ph.D. Degree Candidates who enter without an M.S. Degree: Maximum of five years total support from any source.\*
- UTK M.S. Degree Candidates who wish to stay on for the Ph.D. Degree: The student must meet the following criteria to obtain support for a period of up to three additional years from any source:
  - ◆ Be admitted to the Ph.D. program.
  - ◆ Pass the Ph.D. qualifying examination before consideration for support as a Ph.D. degree candidate.
  - ◆ Complete the requirements for the M.S. degree before receiving support as a Ph.D. student.

\* In exceptional cases, support may be extended beyond the stated time limits, if the student's research advisor wishes to use external research funds for this purpose.

Financially supported students are expected to be in residence throughout the calendar year, engaged in full time study and research, except for university holidays and vacation time of two additional weeks. Note that university holidays do not always correspond with academic breaks (e.g., winter and spring breaks). Absence during these periods applies to vacation time. The university holiday calendar is available online at [http://humanresources.tennessee.edu/closing\\_schedules.html](http://humanresources.tennessee.edu/closing_schedules.html).

### ***Fellowships***

A limited number of graduate fellowships are available at the university. See the Graduate School web page for more information (<http://gradschool.utk.edu/gradfund.shtml>). Applicants meeting very strict GPA and GRE standards will be nominated for College of Engineering's Athletic Department Fellowships by the Graduate Admissions Committee.

### ***Loans***

Types of loans administered by the Financial Aid Office are described at <http://finaid.utk.edu/aid/loans/>.

## ***Employment***

The assistantship and course work constitute a full-time job. Students holding departmental assistantships may not hold outside employment while on a 50% appointment. Violation of this policy may result in termination of the assistantship. Those on other university assistantships must adhere to the restrictions of those programs. Unfunded students may seek employment on or off campus.

## ***Support for Travel***

Travel on university business (e.g., to technical conferences) must be approved in advance. See your advisor or the departmental business manager for more information. The Graduate Student Senate administers a Student Travel Fund that may provide funds to support travel to conferences or for other professional purposes. Information is available at <http://web.utk.edu/~gss/travelawards/index.php>.

## **4. REGISTRATION AND ADVISING**

### ***General Registration Issues***

Graduate students must register using the online registration system found through MyUTK (<http://registrar.tennessee.edu/registration.shtml>). Details and academic calendars are available at the Registrar's web site. Most students holding assistantships generally must register for each term (Fall, Spring, Summer). Registration typically opens during the preceding term; see the Registrar's web site for the university calendar with registration dates listed.

All students in the CBE program holding assistantships should register for 9 – 13 credit hours each fall and spring semester. Under special circumstances, registration for course loads outside this range may be approved by the DGS and/or department head. Students without assistantships must register for a minimum of 9 credit hours to maintain full-time status and should normally register for 9 – 13 credit hours each semester. Registration for more than 13 hours requires approval of the department head. Students with assistantships should normally register for 3 – 6 credit hours during the summer term.

CBE 502 allows students who would not otherwise be registered, but will use any university facilities, to be registered. Registration for this course would require unusual circumstances for a CBE student.

CBE 500 and CBE 600 are appropriate for those students spending significant time performing M.S. or Ph.D. thesis research, respectively. The bulk of a Ph.D. student's registered course hours in any semester beyond the first year are typically CBE 600, as suggested on the sample course registration provided at the departmental orientation upon arrival in the fall. Once a student registers for CBE 600, the student must register for this course every term thereafter until graduation.

Students should be aware that course fee reimbursement stemming from withdrawal from a course follows a graduated schedule depending on the date of withdrawal; for example, full fee recovery requires dropping within the first five days of the semester. See [onestop.utk.edu](http://onestop.utk.edu) for the full fee recovery schedule.

### ***Advisor Selection***

The Director of Graduate Studies serves as an interim advisor for new students. The director will consult with the student upon request and will review the student's experiences, academic background, and interests, and will recommend a program of study for the student's first term in residence.

Ph.D. students and thesis M.S. students should choose a permanent, or major, advisor before the end of the first term in residence. The permanent advisor will serve as the chair of the thesis or dissertation

committee, direct the research, and advise the student on an appropriate program of study consistent with the student's research interests and long term professional objectives.

Advisor selection is the most important task facing new Ph.D. students in the first semester. The process begins with a series of short talks by faculty during the Fall semester. Students should also make appointments with several faculty members for the purpose of exploring mutual research interests, learning about ongoing research projects, determining the resources (e.g., laboratory facilities, analytical equipment, computational facilities, etc.) that may be required for a particular research program, and sources of future financial support. Students are also encouraged to speak to current members of the faculty labs.

Approximately halfway through the fall semester, students will submit a list of their top three choices for research advisors to the Director of Graduate Studies. The DGS will consult with the faculty to determine the willingness of the potential advisor to mentor a given student, and advising assignments will be made. The major advisor will then assume all advising responsibilities; these responsibilities include continuously overseeing research project development and progress, advising on course selection each semester, and regular advice on professional development.

## **5. DEGREE REQUIREMENTS**

### ***M.S. Degree (thesis option)***

M.S. students may choose a thesis-option Master of Science degree. Minimum departmental requirements for the degree are as follows:

- A total of at least 21 semester hours in graduate-level courses (excluding CBE 500, CBE 501, CBE 503, CBE 511) in chemical and biomolecular engineering and related areas beyond the baccalaureate. These courses must include the four core courses.
- Research and a thesis to give at least 9 hours of credit in CBE 500.
- Active participation in graduate seminars in the department. Resident students must register for CBE 501 or a departmentally approved substitute every semester it is offered.
- A final oral examination covering the thesis and related fields and graduate course work.

The Master of Science program culminates with an oral examination in which the student defends the written thesis in a critical examination by the committee. Questions pertinent to the student's course work may also be asked in order to measure the student's ability to integrate the material in the major and related fields of study. This examination must be scheduled, the thesis document distributed to the committee members, and the thesis defended consistent with deadlines published in the Graduate Catalog (see <http://gradschool.utk.edu/datedgraduation.shtml>). In case of failure, the candidate may not apply for re-examination until the next regularly scheduled examination period. The result of the second examination is final.

Candidates have six calendar years from the time of enrollment in The Graduate School to complete the degree requirements.

### ***M.S. Degree (non-thesis option)***

The standard master's program is the non-thesis option leading to the Master of Science degree. The requirements for completion of the M.S. degree, non-thesis option, are as follows:

- Completion of a total of 30 hours of graduate course work. At least 18 of those hours must be in the department.



- Active participation in graduate seminars in the department. Resident students must register for CBE 501 or a departmentally approved substitute every semester it is offered.
- Satisfactory completion of a culminating experience CBE 580 (Critical Review) as this course shall include a comprehensive exam administered by the faculty committee.

A normal three credit-hour course requires 45 contact hours and 90-135 additional hours outside the classroom. The student should therefore plan on spending at least 135-180 hours of library research and conceptual/developmental work on his/her review paper.

The student should choose a topic and a committee no later than the semester prior to registering for CBE 580. The committee will consist of the major professor as chairman and at least two additional members holding the rank of assistant professor or above.

A meeting should be held promptly with the committee for the purpose of approving the student's topic and outline of the proposed work and work schedule. The outline must be approved by the committee before the student registers for CBE 580.

The resulting review paper is expected to be equivalent in quality to one of the following documents and could be submitted for consideration for publication with the student and major professor as co-authors:

- A paper to any technical journal approved by the candidate's committee.
- A paper suitable for presentation at any technical meeting approved by the committee.
- A research proposal to an appropriate Directorate of the National Science Foundation.
- An internal publication by the candidate's employer, approved by the committee. This provision allows proprietary research to be used to satisfy the requirements of CBE 580.

### ***Ph.D. Degree***

A total of 72 credit hours beyond the bachelor's degree are required for the PhD degree. These consist of course work hours and research and dissertation credit hours (CBE 600). The Ph.D. is first and foremost a research degree, and emphasis is accordingly placed on completion of a high quality research thesis. In most cases, research suitable for publication in peer-reviewed technical journals is expected.

Specifically, the departmental requirements consist of the satisfactory completion of:

- A minimum of 36 semester hours in graduate level courses (excluding CBE 600) in chemical engineering and related fields beyond the baccalaureate. These courses must include the four core courses and at least 6 hours of courses at the 600 level from the University of Tennessee, Knoxville.
- The Ph.D. qualifying examination, consisting of a written part and an oral part. The written part covers the core fundamentals of the program (see the qualifying exam description in section 6 below), while the oral part is a presentation based on original research.
- The comprehensive examination, consisting of a written part and an oral part. The written part is the dissertation proposal document (see section 6). The defense of the dissertation proposal constitutes the oral portion of the exam.
- A minimum of 24 credit hours of research and dissertation credit in Chemical Engineering 600. Registration must be continuous from the time research begins (see the Continuous Registration requirement in the Graduate Catalog for further details).
- Successful oral defense of the dissertation before the student's dissertation committee.
- Active participation in graduate seminars conducted by the department. Resident students must register for CBE 501 or a departmentally approved substitute every semester offered.
- At least two semesters of service as a teaching assistant in departmental courses

## **Core and Elective Courses**

The following required courses must be completed by M.S. and Ph.D. degree students:

- CBE 506 (Engineering Analysis), Fall
- CBE 579 (Advanced Biomolecular Engineering), Fall
- CBE 531 (Advanced Chemical Engineering Thermodynamics), Spring
- CBE 547 (Advanced Transport Phenomena), Spring

All full time graduate students are also required to take CBE 501 (Graduate Seminar), or a departmentally approved substitute, each semester that it is offered. This 1 credit hour course may be counted for up to six credits toward the 36 credit course work requirement. Graduate students conducting their research at the Oak Ridge National Laboratory (ORNL) or other off-campus locations sometimes experience difficulty attending the CBE 501 seminars. In these cases, alternative seminars presented at the research site may be substituted by providing documentation for approval by the instructor of record for CBE 501.

The remainder of the required course work credits may be fulfilled with technical elective courses. Any approved courses listed in the graduate catalog under any engineering or certain science programs may be counted as a technical elective with advisor approval. Approved elective sciences include , e.g., math; physics; chemistry; biochemistry, cellular, and molecular biology; microbiology; plant sciences. Other courses with substantial technical content may be counted with approval by the advisor and the Director of Graduate Studies. The elective course plan should be developed in consultation with the advisor. Non-thesis M.S. students must choose six credits of these electives from the CBE course offerings to meet the minimum 18 credit requirement for the degree.

Students with B.S. degrees in disciplines other than chemical engineering may need to complete some undergraduate course work prior to enrolling in the graduate core courses. Students considering taking these courses should consult the Director of Graduate Studies or other faculty prior to registration in order to establish a customized plan for addressing the necessary background in key topics. Relevant undergraduate courses to consider include:

- CBE 201 Chemical Engineering Fundamentals
- CBE 240 Fluid Flow and Heat Transfer
- CBE 250 Introduction to Chemical Engineering Thermodynamics
- CBE 340 Mass Transfer and Separation Processes
- CBE 450 Chemical Reactor Fundamentals

## **Minors and Certificates**

Additional programs are available to CBE graduate students. Participation in these programs requires early planning and should be pursued only with advisor approval. Students not yet assigned a permanent advisor should consult with the Director of Graduate Studies.

- Intercollegiate Graduate Statistics Program  
MS and PhD students can obtain a minor or a MS in statistics with an MS/PhD in Chemical Engineering. This requires relatively little additional coursework.  
All information and requirements at: <http://www.bus.utk.edu/stat/igsp/>
- Interdisciplinary Graduate Minor in Computational Science  
MS and PhD students can obtain a minor in computational science with an MS/PhD in Chemical Engineering. This requires relatively little additional coursework.  
All information and requirements at: <http://igmcs.utk.edu/>

Note: MS and PhD members of the UT Computational Materials Research Group are required to participate in this program.

- Graduate Certificate in Reliability and Maintainability Engineering

MS and PhD students can obtain a certificate in Reliability and Maintainability Engineering with the MS/PhD in Chemical Engineering. This program requires four courses, all of which can count toward the graduate course requirement.

All information and requirements at: <http://www.engr.utk.edu/rme/certificate.html>

- Dual MS-MBA

Students may simultaneously pursue an MS in Chemical Engineering and an MBA. This program requires substantial additional coursework. Information and requirements can be found in the current Graduate Catalog.

- Non-Thesis MS along the way to a PhD

All students in the CBE PhD program should complete a non-thesis MS during their studies. This requires completing the Request for Concurrent Master's Degree form, found at [http://gradschool.utk.edu/forms/RequestforConcurrentMastersDegree\\_reader.pdf](http://gradschool.utk.edu/forms/RequestforConcurrentMastersDegree_reader.pdf). The course work requirements of the PhD program allow completion of the MS with the addition of CBE 580 as one of the courses.

- Certificate in Sustainability Science

The Department of Chemical and Biomolecular Engineering offers a graduate certificate in sustainability science (see <http://stair.utk.edu>) designed to prepare students to be conversant in all of the fields relevant to sustainable energy production. The program draws upon the strengths of faculty members in five departments: Chemical and Biomolecular Engineering; Civil and Environmental Engineering, and Materials Science and Engineering in the College of Engineering; and Biochemistry, Cellular and Molecular Biology and Chemistry in the College of Arts and Sciences. The required courses focus upon the fundamental scientific concepts and the social and political considerations involved in developing sustainable energy.

Admission: Students must be admitted as degree-seeking graduate students either in master's programs, doctoral programs, or as certificate students. Other graduate students with strong mathematical preparation may apply with the specific consent of the program coordinator. Application to the certificate program is made by submitting graduate transcripts and a letter of application to the program coordinator.

Program of Study: The 12-hour certificate is earned by completing CBE 571 or CBE 572 and a minimum of 3 hours, but no more than 4 hours, of CBE 503 or CBE 673. Other course credits may be taken from a pool of courses approved by the STAIR committee. Students must maintain a GPA of 3.00.

- Energy Science and Engineering Concentration

This concentration is offered in collaboration with the Center for Interdisciplinary Research and Graduate Education (CIRE). The CIRE is a joint effort between the College of Engineering, other University of Tennessee colleges, and the Oak Ridge National Laboratory. Students who wish to pursue this concentration will normally have completed 6 Core credit hours, 3 credit hours of Knowledge Breadth, and 6 credit hours of Knowledge Specialization coursework (minimum 15 hours), as specified under the "Energy Science and Engineering Major, PhD" section of the Graduate Catalog.

## **Committees**

**Ph.D.:** The major professor directs the student's dissertation research and chairs the dissertation committee. The student and the major professor identify a doctoral committee composed of at least four faculty members holding the rank of assistant professor or above, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from an academic unit other than that of the student's major field. Students are encouraged where appropriate to seek a fifth member in the field of specialization from outside the university to serve on their dissertation committee. This committee is nominated by the department head or college dean and approved by the Dean of the Graduate School. The makeup of the committee must be approved by the Graduate School before the oral part of the comprehensive examination is conducted. The form for approval of the dissertation committee is obtained from the Graduate School web site (<http://gradstudies.utk.edu/gradforms.shtml>).

The student's committee should be formed within two years of entering the program (for full-time students) and should subsequently meet at least once per year to review the student's progress and to discuss the research project. Following the student's admission to candidacy, an annual progress report form must be completed, presented to the committee, and submitted to the department office.

**M.S.:** Each student must have an advisor, and the student and advisor select a thesis committee or CBE 580 committee for non-thesis students. The committee must consist of the advisor and at least two faculty members of the rank of assistant professor or above. At least two members of the committee must be CBE faculty. The committee's responsibility is to assist the student in planning a course of study and in carrying out the research and to assure that the degree requirements are fulfilled. If the student is pursuing a minor, one member of the committee must be from the minor department.

Application for candidacy must be made as soon as possible after the student has completed required prerequisite courses, if any, and nine hours of graduate course work with a GPA of 3.0 or higher, in all graduate course work. Admission to candidacy confirms that the graduate committee and the Graduate School agree that the student has demonstrated the ability to do acceptable graduate work and that normal progress has been made toward the degree. The student must submit the Admission to Candidacy form (<http://gradstudies.utk.edu/gradforms.shtml>), signed by the committee members, listing all courses to be used for the degree, to the Office of Graduate Admissions and Records no later than commencement day of the semester preceding that of graduation.

## **6. EXAMINATIONS**

Graduate School requirements related to examinations for graduate degrees are described in the Graduate Catalog.

### ***Final Examination for Non-Thesis M.S. Students***

The Graduate School requires that each non-thesis student must pass a final comprehensive written examination. The examination is not merely a test over course work, but a measure of the student's ability to integrate material in the major and related fields. CBE students must register for CBE 580 in the final semester and submit a critical review of current literature on a selected topic for approval by the committee, as described above. This written critical review serves as the final exam, in accordance with Graduate School requirements. In addition, the committee may choose to require an oral examination at which the written review is presented and defended. In case of failure, the candidate may not apply for re-examination until the following semester. The result of the second examination is final.

### ***Final Examination for Thesis-Option M.S. Students***

The thesis-option M.S. program culminates with an oral examination in which the student defends the thesis in a critical examination by the committee. Questions pertinent to the student's course work may also be asked in order to measure the student's ability to integrate the material in the major and related fields of study. This examination must be scheduled and defended consistent with deadlines published in the Graduate Catalog and on the Graduate School web site (<http://gradschool.utk.edu/ddategraduation.shtml>). The final draft of the thesis must be distributed to all committee members at least two weeks prior to the date of the final examination. In case of failure, the candidate may not apply for re-examination until the following semester. The result of the second examination is final.

### ***Qualifying Exam for Ph.D. Students***

The qualifying exam comprises both a written and an oral portion. The written portion is administered in order to assess the student's level of competence in the core areas and to establish that the student can think analytically and creatively. This examination, set at the level students are expected to attain at the end of one year of graduate study following completion of the four core courses, covers four major areas: applied mathematics, thermodynamics, transport phenomena, and biomolecular engineering. The exam is administered annually a few weeks after the end of the spring semester and is normally scheduled in four sections spanning two days.

Primary assessment of student performance on individual questions is performed by question authors; performance assessment is reviewed and overall outcome decisions made by a committee consisting of the entire voting faculty of the department.

The oral portion of the qualifying exam is normally administered near the beginning of the fall semester (i.e., at the beginning of the second year in residence for most students). The oral exam consists of the defense of a research proposal and is evaluated by a committee of at least three departmental faculty members. One member of this committee will be chosen by the student, one by the advisor, and one by the Director of Graduate Studies. This committee need not be identical to the student's eventual Ph.D. thesis committee.

Students must pass both portions of the qualifying exam for continuation in the Ph.D. program. In rare cases, the faculty may decide to conditionally approve a student's qualifying exam performance contingent upon meeting a customized plan of action to address minor deficiencies in the student's demonstrated competence. In cases of failure, the faculty may recommend that the student be offered the opportunity for re-examination the following year. This re-examination could be either the written or oral portion or both. The student must formally request this re-examination. In other cases, the failure decision is final. Decisions are communicated to the candidates in writing by the Director of Graduate Studies.

### ***Ph.D. Thesis Proposal***

The thesis proposal includes a written research plan and an oral defense of this plan. These elements respectively constitute the written and oral comprehensive examinations specified by the Graduate School and described in the graduate catalog.

The written proposal consists of a well-developed but concise statement, not more than ten pages in length, describing the research to be undertaken along with the objectives, methodology, and an exhaustive review and critique of the related literature. A detailed research plan including the resources required in order to conduct the work and a time table for completion of the proposed research completes the proposal. The final draft of the written proposal must be distributed to the dissertation committee not less than two weeks before the scheduled oral presentation of this research proposal, described below.

Proposals generally require substantial input on the part of the major professor, who participates in guiding the direction the research is expected to take. Numerous students have found the course English 462 - Writing for Publication - useful in preparing a sound and well-organized proposal. Some advisors recommend that their students take this course for credit during the term during which they are writing their proposal.

The student stands for an oral presentation of the thesis proposal, open to all interested parties, after writing the thesis proposal. The dissertation committee subsequently examines the student in closed discussion. This examination primarily covers the proposed research but may also cover course work completed by the student that is germane to the proposed research. The examination is administered and controlled by the dissertation committee; the committee examines the student and decides if the student passes or fails the defense of the research proposal. Re-examination in cases of failure is at the discretion of the dissertation committee and must be completed within a time frame decided by the committee.

The thesis proposal defense must be completed by the end of the third year in residence and at least 12 months prior to the final dissertation defense. Exceptions for extenuating circumstances must be granted by the Director of Graduate Studies.

A doctoral student may be admitted to candidacy after passing the thesis proposal, but no later than one full semester prior to completion of the degree requirements. To apply for candidacy, obtain the application form from the Graduate School web site (<http://gradstudies.utk.edu/gradforms.shtml>). The student must have achieved a GPA of at least 3.0 (B) and must have passed both the qualifying exam and thesis proposal in order to be admitted to candidacy. The completed form lists the courses taken, the grades received, and the courses remaining to be completed in order to satisfy requirements. The form is submitted to the Office of Graduate Admissions and Records. The Graduate School checks to make sure all the requirements are satisfied and returns a copy to the student. The date by which you must finish all requirements (eight years after entering the program) will be indicated on the returned copy.

### ***Ph.D. Dissertation and Final Defense***

The dissertation is the permanent record of the results of the original research project, their interpretation, and the conclusions that are drawn from the investigation. The writer points out the novel features of the work and explains in detail how the work was conducted, to the extent that a person skilled in the discipline can repeat the work by reference to the dissertation alone.

Students are encouraged to participate in dissertation workshops, which are announced each term on the Office of Graduate Studies web site, before drafting their document. The format of the dissertation must be approved by the Graduate School. Consultants are available to advise on mechanical details such as margins, page numbering, etc.

The student is required to supply an electronic copy of the final dissertation to the Office of Graduate Studies. The Office of Graduate Studies provides specific information about how this document is to be created and transferred to the library. ***One copy must also be given to the department for its collection.*** The electronic copy must therefore be submitted to the Graduate Assistant, and the CBE office staff will arrange for its submission to the Graduate School. The CBE office will also arrange for binding of the departmental collection copy and will cover the cost of this binding. The office staff can arrange for additional bound copies for the student if desired; the cost of binding is ~\$16. The student is always expected to provide a hard bound copy of the thesis to the major advisor, and the student should provide copies to the other committee members, if requested. These additional copies may be soft bound.

The dates by which the defense must be scheduled, the dissertation defended, and the dissertation submitted to the Office of the Graduate Admissions and Records in final form are published each semester on the Graduate School web site (<http://gradschool.utk.edu/ddategraduation.shtml>). The

candidate normally submits the first draft of the dissertation to the major professor. When the dissertation is acceptable to the major professor, it is presented to the other committee members. The committee shall have at least two weeks to read the document in preparation for the final examination, as required by Graduate School policy.

The final examination of the Ph.D. program is an oral exam in which the candidate defends the dissertation and responds to any related questions the committee may ask. The oral defense consists of a summation of the work, presented to all interested parties, including other graduate students, followed by an examination conducted by the committee in private. The committee decides whether the candidate has passed the examination or not. The dissertation approval sheets are signed by the committee when the document is acceptable in final form, proofread, and corrected. Re-examination in the case of failure is at the discretion of the committee.

## **7. STANDARDS, PROBLEMS, AND APPEALS**

### ***Maintaining Good Standing***

All students must maintain a cumulative GPA of 3.0, in accordance with Graduate School policy. Students falling below 3.0 will be placed on academic probation; if any semester GPA is below 3.0 prior to the cumulative GPA being raised to 3.0 or higher (prompting removal from probation), the student will be dismissed from the university by the Dean of the Graduate School.

Following establishment of a thesis or dissertation committee, each student's progress should be assessed annually by the committee. This assessment should include submission of a short progress report form, provided by the Graduate Assistant, to be signed by the committee members. At the discretion of the committee, an oral presentation of progress may also be required. Unsatisfactory research performance as determined by the committee may result in dismissal from the program.

### ***Academic Integrity***

All students are expected to comply with the honor statement signed on the application for admission. Academic or research misconduct by a student will result in dismissal from the program.

### ***Appeals***

Appeals of examination decisions should be first discussed with the advisor or major professor and subsequently requested by contacting the Director of Graduate Studies within six months of the examination. The GPC may request that the department head appoint an *ad hoc* committee to further review the initial assessment and issue a decision regarding the appeal. Please refer to the Hilltopics (<http://dos.utk.edu/hilltopics/>) and the Graduate Council Appeal (<http://gradschool.utk.edu/GraduateCouncil/AcadPoli/appealprocedure.pdf>) publications for information regarding appeals of departmental decisions.

## 8. APPENDICES

### *Pertinent Graduate Student Web Pages*

Best Practices in Teaching	<a href="http://gradschool.utk.edu/orientation/teaching.shtml">http://gradschool.utk.edu/orientation/teaching.shtml</a>
Center for International Education	<a href="http://international.utk.edu">http://international.utk.edu</a>
Counseling Center	<a href="http://counselingcenter.utk.edu">http://counselingcenter.utk.edu</a>
Funding for Graduate Students	<a href="http://gradschool.utk.edu">http://gradschool.utk.edu</a>
Graduate School	<a href="http://gradschool.utk.edu">http://gradschool.utk.edu</a>
Graduate Catalog	<a href="http://gradschool.utk.edu">http://gradschool.utk.edu</a>
Graduate Student Appeals Procedure	<a href="http://gradschool.utk.edu/studappresrce.shtml">http://gradschool.utk.edu/studappresrce.shtml</a>
Graduate Student Senate	<a href="http://web.utk.edu/~gss">http://web.utk.edu/~gss</a>
Graduate and International Admissions	<a href="http://admissions.utk.edu/graduate/">http://admissions.utk.edu/graduate/</a>
International House	<a href="http://web.utk.edu/~ihouse">http://web.utk.edu/~ihouse</a>
Judicial Affairs	<a href="http://web.utk.edu/~osja/">http://web.utk.edu/~osja/</a>
Office of Equity and Diversity	<a href="http://oed.utk.edu">http://oed.utk.edu</a>
Office of Multicultural Student Life	<a href="http://omsa.utk.edu">http://omsa.utk.edu</a>
Research Compliance/Research with Human Subjects	<a href="http://research.utk.edu/compliance/">http://research.utk.edu/compliance/</a>
International Teaching Assistant Testing Program	<a href="http://gradschool.utk.edu/speakttest.shtml">http://gradschool.utk.edu/speakttest.shtml</a>
Thesis/Dissertation Website	<a href="http://web.utk.edu/~thesis/">http://web.utk.edu/~thesis/</a>
VolAware	<a href="http://volaware.utk.edu">http://volaware.utk.edu</a>
Library Resources for Graduate Students	<a href="http://www.utk.edu/currentstudents/">http://www.utk.edu/currentstudents/</a>
Office of Information Technology	<a href="http://oit.utk.edu/">http://oit.utk.edu/</a>
Housing	<a href="http://gradschool.utk.edu/housing.shtml">http://gradschool.utk.edu/housing.shtml</a>
Dropping Classes (important info on fee rebates)	<a href="http://onestop.utk.edu/your-classes/how-do-i-drop-classes/">http://onestop.utk.edu/your-classes/how-do-i-drop-classes/</a>
One Stop Express Student Services	<a href="http://onestop.utk.edu">http://onestop.utk.edu</a>
Student Fee Information	<a href="http://onestop.utk.edu/files/2013/08/grad_tuition_fees-2013.pdf">http://onestop.utk.edu/files/2013/08/grad_tuition_fees-2013.pdf</a>

### *Forms and Additional Resources*

See the Graduate School Website at <http://gradschool.utk.edu/gradforms.shtml> for important forms.

Additional departmental forms will be posted on the CBE website.



### ***Timeline of Important Departmental Deadlines for Ph.D. Students***

Dates are indicated for students entering in the fall semester (i.e., the year begins August 1); students entering the program in the spring may be on a different schedule. Extensions of these deadlines must be requested from the Director of Graduate Studies and require advisor approval.

<b>Date</b>	<b>Year</b>	<b>Time in Residence</b>	<b>Checkpoint</b>
May/June	1 <sup>st</sup>	0.75	Written portion of qualifying exam
Aug/Sept	2 <sup>nd</sup>	1.0	Oral portion of qualifying exam
August	3 <sup>rd</sup>	2	Doctoral committee appointment form
By July yr. 3	2 <sup>nd</sup> /3 <sup>rd</sup>	1.5 - 3.0	Thesis proposal (written and oral comprehensive exam)
By July	3 <sup>rd</sup>	3.0	Admission to candidacy form
May	4 <sup>th</sup> - ?	3.75 - ?	Annual progress report form
---	4 <sup>th</sup> - ?	3.5 + ?	Defense of dissertation exam

## ***Degree Requirement Checklists***

### **MS degree**

- CBE 501 every fall and spring semester
- CBE 506
- CBE 531
- CBE 547
- CBE 579
- Admitted to candidacy
- $\geq 30$  (non-thesis) or 21 hr total course work
- CBE 580 (non-thesis) or  $\geq 9$  hr CBE 500
- Thesis submitted and defended (thesis MS only)
- Employment and forwarding info submitted to CBE office, if applicable

### **PhD degree**

- CBE 501 every fall and spring semester
- CBE 506
- CBE 531
- CBE 547
- CBE 579
- Qualifying exam
- $\geq 6$  hr of 600-level courses from UT
- $\geq 36$  hr total course work
- $\geq 24$  hr CBE 600
- $\geq 2$  semesters service as teaching assistant in CBE courses
- Thesis proposal
- Dissertation defense
- Dissertation conforms to Graduate School formatting requirements
- Final draft of dissertation submitted to CBE office
- Arrangements made for binding advisor's copy of dissertation
- Employment and forwarding info submitted to CBE office, if applicable

## Sample Assessment Forms

**University of Tennessee at Knoxville  
Chemical and Biomolecular Engineering Program  
CBE 580/MS Thesis Evaluation Form**

*This form must be returned to the CBE Department Head via the Graduate Program Assistant.*

Student Name:

UTK ID:

Date of Defense:

### **Program Objectives:**

1 = Unsatisfactory; 2 = Satisfactory; 3 = Excellent

*1. Synthesize current state of knowledge in a technical sub-field via analysis of the scholarly literature*

A	Knowledge of research field	1	2	3
B	Analysis of opportunity for novel research project	1	2	3

*2. Critically analyze the literature to identify unaddressed issues or opportunities in the field*

A	Creativity of research problem chosen	1	2	3
B	Potential of solution to the research problem in advancing knowledge	1	2	3

*3. Clearly communicate current knowledge or original research orally and in writing*

A	Clarity and professionalism of presentation of research in written report/thesis	1	2	3
B	Clarity and professionalism of presentation of research in oral exam	1	2	3

**University of Tennessee at Knoxville  
Chemical and Biomolecular Engineering Program  
PhD Dissertation Defense Evaluation Form**

*This form must be returned to the CBE Department Head via the Graduate Program Assistant.*

Student Name:

UTK ID:

Date of Defense:

**Program Objectives:**

1 = Unsatisfactory; 2 = Satisfactory; 3 = Excellent

*1. Synthesize current state of knowledge in a technical sub-field via analysis of the scholarly literature*

A	Knowledge of research field	1	2	3
B	Analysis of opportunity for novel research project	1	2	3

*2. Identify an important problem to solve or question to ask within the specialty field*

A	Creativity of research problem chosen	1	2	3
B	Potential of solution to the research problem in advancing knowledge	1	2	3

*3. Create new knowledge or technology addressing an important problem or question in the specialty field through conduct of original research*

A	Appropriate, state-of-the art methods	1	2	3
B	Effective analysis of research results and data	1	2	3
C	Ability to make independent, significant, original contributions to the research field	1	2	3
D	Awareness of broader implications, including social, economic, technical, or ethical aspects	1	2	3

*4. Clearly communicate scholarly research and results orally and in writing*

A	Clarity and professionalism of presentation of research in written dissertation	1	2	3
B	Clarity and professionalism of presentation of research in oral defense	1	2	3
C	Journal or conference publications have resulted/are anticipated from this research	1	2	3