

Guidelines for Graduate Study

Vanderbilt ChBE Program

Overview

Graduate study provides a unique opportunity for students and faculty to work together in advancing knowledge through innovative research. This opportunity allows students to apply concepts they learn in the classroom to real-world problems and experience the excitement of scientific discovery. In addition, students gain a mentor who can guide them through the joys and frustrations of a research career. They also obtain experience in communicating their research results to the scientific and technical community by writing manuscripts for publication and giving presentations at conferences. Both the student and mentor benefit significantly when they work together as a team, respecting each other's abilities and responsibilities. Both suffer when this mutual respect is missing. These guidelines are formulated so students can better understand what is expected of them and their faculty mentors.

Faculty Responsibilities and Expectations

Although graduate students are familiar with the roles of faculty as teachers and mentors, they are often unaware of the other duties and responsibilities of the faculty. A partial list of expectations and responsibilities of ChBE faculty members is given below.

- **Research.** Faculty are expected to engage actively in research; publish results in the scientific literature; present results at scientific conferences and invited lectures; regularly survey relevant scientific literature; attend departmental seminars; mentor and supervise their research team; secure suitable facilities and lab/office space to conduct research; establish collaborations with other faculty where appropriate; and regularly evaluate graduate student research progress. They must devote substantial effort toward writing proposals to funding agencies that sponsor their research. Funded research grants provide financial support for most graduate students and other research personnel in the ChBE program. In addition to supporting the direct costs of research (e.g., personnel, lab supplies, capital equipment, travel, etc.), funded grants are also typically assessed indirect costs which support the infrastructure and environment necessary to keep labs running. The direct cost of tuition, stipend, fees and health insurance benefits for a graduate student supported on a research grant is approximately \$50,000 per year. When additional charges for lab supplies, indirect costs, and other research and travel expenses are included, the total funds required to support a graduate student typically exceeds \$100,000 per

year. For this reason, the responsibility of faculty to submit competitive grant proposals and to effectively manage their research budgets is a major determinant of the success of the graduate program.

- **Mentoring Trainees.** In addition to providing financial support to the students and postdoctoral scholars in their labs, faculty are expected to mentor their trainees by providing advice to further their academic, research, and professional development. This involves establishing a supportive lab environment, establishing guidelines and policies for working in the lab, training lab members in research methodologies, and helping trainees plan their research. It is important that faculty anticipate and communicate deadlines regarding publications, presentations, and grant proposals to trainees, and provide timely feedback to trainees on their manuscript drafts, dissertation/thesis documents, and presentations. It is also important for faculty to provide opportunities for trainees to participate in scientific conferences, workshops, and other professional development activities. Finally, many faculty provide career advice, networking opportunities, and job search assistance to their students.
- **Teaching.** Faculty are expected to teach undergraduate and/or graduate level courses. They are responsible for the content, lectures, and grading in these courses. They must coordinate the tasks of their Teaching Assistants (TAs), collect course data for program accreditation, and review course and TA evaluations to improve their teaching. They hold weekly office hours to teach the students in one-on-one and/or small group settings. They occasionally develop new courses that incorporate recent research findings or innovative teaching methods.
- **Service.** Faculty are expected to commit service to the University and to their profession. University service involves participating in university-wide committees and councils (e.g., Graduate Faculty Council, Faculty Senate, etc.), as well as School of Engineering committees and advisory boards. They serve the ChBE Department through roles such as Director of Graduate Studies (DGS), Director of Undergraduate Studies (DUS), organizing seminars, serving on departmental committees, and advising students in professional and volunteer organizations. They provide professional and academic advising to students, write letters of recommendation, evaluate graduate applications and recruit prospective graduate students, serve on graduate thesis committees, and evaluate faculty for promotion and tenure. They also provide service to the professional community through activities like serving as a reviewer for scientific journals, serving on review panels for funding agencies, holding national offices in professional societies, organizing scientific conferences, and performing public outreach such as judging science fairs or providing laboratory visits or demonstrations.

- **Accountability.** Faculty submit a written annual report to the ChBE Department Chair on all research, teaching, technology transfer, and service activities, which is forwarded along with the Chair's evaluation to the Dean. They also submit written annual and/or quarterly summary reports to funding agencies for each grant awarded and participate in periodic site visits for research grants and training grants. Students should note that many faculty activities involve submission of proposals, summaries, or evaluations. In addition, faculty are periodically evaluated by their faculty colleagues, Department Chair, funding agencies, and students through course and mentor evaluations. In short, faculty members are expected to meet high standards for research, teaching, and service, and they are held accountable for their activities. Failure to meet expectations in these areas can result in denial of promotion/tenure, limited (or no) annual salary increases, or loss of lab funding or lab space.

Responsibilities and Expectations of ChBE Graduate Students

To facilitate the success of their academic and research training, graduate students should be aware of some important program expectations and student responsibilities. These, along with relevant guidelines, are provided below.

- **Choosing a lab.** New graduate students are expected to familiarize themselves with available research projects in the ChBE Department and discuss lab-specific and project-specific expectations with the faculty before selecting an advisor. New students are encouraged to explore the variety of available projects and types of research before choosing a lab. Because standards can vary widely between different research areas, students should not expect all ChBE labs (or even all projects within a given lab) to adhere to the same norms. Some professors maintain a written document that describes lab policies and expectations for members of their research group. You should ask to review this document BEFORE choosing a lab. If such a document is not available, you should make sure to ask specific questions about the operation of the lab when you meet with potential advisors. It is often useful to speak with current or former lab members to get a first-hand perspective on what it is like to work in the lab. Some possible questions include:
 - What is this field of research like, and how will my work contribute to it?
 - What have past lab members gone on to do after graduation?
 - Is the focus of the lab more fundamental science or application-driven?
 - What is your mentoring style (e.g., hands-on/hands-off)?
 - How do you see the lab evolving over the next 5 years?

- How many papers will I be expected to publish before I graduate?
- Will I work on one project or multiple projects at a time?
- How many hours and at what times will I be expected to work each week?
- How often will group and individual meetings occur?
- How will we establish plans for my project and evaluate progress? What happens if we disagree?
- Which lab members or collaborators will I be working closely with?
- How do you decide the author order if more than one person has contributed to a paper?
- What specific skills or training is required to work in the lab, and how will I acquire those skills? Can I still join the lab if I lack certain skills or expertise?
- Are there any potential hazards I should know about? Will I be expected to work with e.g., animals, cells, toxins, radiation, lasers?
- What is the lab structure in terms of personnel? Is there a lab manager? Post-docs? Research scientists? And what are their duties/expectations in the lab compared to a graduate student?
- Are certain lab personnel responsible for “owning” (operating and maintaining) specific lab equipment/instruments? Or is everyone expected to operate and maintain equipment as needed based on their projects?

In short, you want to know what will be expected of you if you join the lab.

- **Research.** Under the supervision of their advisor, graduate students are expected to engage in research during the academic year and in the summer, and to maintain a high level of motivation. They are expected to gain the background knowledge and skills needed to successfully pursue their research project(s). Students should work with their advisor to develop a plan that includes a timetable and milestones for completion of each stage of their research. Students are expected to attend lab meetings, to work as a member of the research team, to encourage and assist other lab members, to plan enough time each week to achieve their research milestones, to assist their research advisor in preparing research proposals and publications, and to regularly monitor the scientific literature relevant to their research. Graduate students may be asked to help peer-review manuscripts that have been assigned to the advisor, if it meets the guidelines of the journal. Students should be proactive in efforts to advance their project, for example, by developing and presenting ideas to their advisor and making connections with other groups to learn new research

methods and approaches. They should meet with their advisor regularly to assess research progress and discuss possible revisions to their plan. Students should strive to meet appropriate deadlines and adhere to their research schedule. They should take special care in collecting, labeling and preserving research data and should provide the research supervisor with full access to all data and software. Research data and files should be protected by backing them up regularly while also taking steps to ensure their security. Ask your lab supervisor to designate where and how research files should be backed up to avoid potential confusion or data loss.

Graduate students should understand that the data they collect and the software and materials they create through the use of Vanderbilt facilities or funds are the intellectual property of the University. Students are free to make copies of data and programs for analysis outside of the lab, but should consult with their research advisor before sharing these resources with individuals outside of the research team.

- **Attendance and Holidays.** The ChBE Graduate Program prepares students to be professionals who are expected to be productive beyond the normal working hours of 9 AM to 5 PM on weekdays. Evenings, weekends, summers and academic breaks are excellent times to engage in research activities. No one expects graduate students to be available 24 hours a day, seven days a week to conduct their research. The number of hours spent on research is a function of the other obligations of the student (e.g., courses, TA responsibilities, departmental service) and the nature of the research project. Students who receive an annual stipend are expected to perform research at least 40 hrs/wk during the summer. Graduate students with full course loads are expected to spend at least 20 hrs/wk on research during the academic year, which should increase as didactic coursework is replaced by research hours. TA duties and other departmental obligations may also offset research hours to some extent, although all graduate students are expected to devote time to research each week once they have been assigned to a lab. Note that these are MINIMUM expectations—the more effort a student devotes to research, the more productive s/he will be. Students who are productive researchers will maximize their chances of successfully passing their qualifying exams, completing their degrees in a timely manner, and finding desirable positions in competitive job markets after graduation. With the exception of Labor Day, students may take standard Vanderbilt University holidays:
 - New Year's Day (January 1)
 - Martin Luther King Jr. Day (third Monday in January)
 - Memorial Day (last Monday in May)
 - Independence Day (July 4)

- Thanksgiving Day (fourth Thursday in November)
- Friday after Thanksgiving Day
- Winter Break (week of Dec 24–31)

Note that academic breaks other than those listed above (e.g., Spring Break) are NOT official holidays. Also note that time-sensitive experiments or research deadlines may dictate that students occasionally work on holidays. If such situations arise, please discuss them with your advisor in advance to make sure your holiday plans do not cause excessive disruptions to your research.

- **Vacation Policy.** Graduate study is an intellectually challenging and physically demanding pursuit that requires a student's full dedication. Intensive study and research on the part of a student naturally requires vacations so that students can relax and reconnect with loved ones and family members. The Graduate School does not provide an official vacation policy for graduate students. Students should establish an understanding of the policies and expectations of his/her research advisor when deciding to join a particular laboratory. Faculty members are likewise encouraged to establish clear and equitable vacation policies for students in their laboratories. In general, students should be permitted a minimum of 10 days of vacation time per year (in addition to official holidays), which should be scheduled in cooperation with the research advisor. If the student does not have a research advisor, vacation leave should be approved by the DGS. Students planning to travel internationally for an extended period of time should keep their advisor informed about their visa and travel status. In keeping with the professional nature of the graduate student-faculty advisor relationship, students should inform their research advisor when they must be absent because of illness or an emergency, just as faculty should inform students when they will be absent for an extended period of time.
- **Parental Leave and Dependent Care.** As defined by the Vanderbilt Graduate Catalog, six weeks of parental leave is allowed for the primary caregiver (whether mother or father) prior to and/or following childbirth or adoption of an infant. During this period, the student's enrollment, stipend, and funding for tuition and health insurance will be continued without interruption. Graduate students will not be penalized for taking parental leave, but should inform their advisor in advance and make appropriate arrangements for research continuance upon return from leave. Students are encouraged to inform their advisor when they feel comfortable disclosing their pregnancy to others, in order to ensure the safety of the mother and unborn child, since some labs work with hazardous materials, mutagens, etc. that may require accommodations. Also note that Vanderbilt has daycare services with adjusted rates based on household income; however, the waitlists can be long.

Students should sign up for the waitlist as soon as their pregnancy is confirmed. There are also other daycare options in Nashville that offer tuition adjustments based on income. Insurance for dependent children may be purchased as an add-on policy to the Vanderbilt Student Health Plan. Alternatively, dependent children may be covered in full through the CoverKidsTN or TennCare programs (based on financial eligibility).

- **Publication.** The outcome of research is new knowledge, delivered to the scientific community in the form of published manuscripts. Reasonable expectations are at least one first-author publication for an MS project and at least three for a PhD project. These publication targets are based on past experience of the amount of original research that is needed to prepare a high-quality MS thesis or PhD dissertation, but they are not meant to be construed as formal graduation requirements. It is the responsibility of the thesis committee to ultimately decide if your research and scholarly achievements are sufficient for graduation. It is also important to emphasize that the number of publications expected of students can vary widely depending on the lab/advisor, the field and nature of the research, and the impact/quality of the scientific journals where the publications appear. Students are encouraged to regularly discuss publication plans with their advisor and committee members, and to prepare draft manuscripts as the research unfolds rather than waiting until the entire project is completed. Presentations at scientific meetings are also encouraged. Students will share authorship on all manuscripts that result primarily from their research and intellectual contributions. Students should work collectively with their advisor and colleagues to prepare manuscripts according to lab authorship policies and to discuss authorship throughout the publication process to ensure there is clear understanding of how each author's contributions should be prioritized. Final authorship decisions and manuscript approvals are the responsibility of the corresponding author (usually the lead principal investigator). The products of graduate student research ultimately belong to Vanderbilt and/or the sponsor who supported the work. Therefore, students and faculty have a joint responsibility to disclose all discoveries and technologies generated by their research through scientific publications and invention disclosures. This responsibility does not end when a student graduates or leaves the lab. Since publication is essential to the research process, the research advisor has the right to submit a manuscript for publication if the student leaves the program, refuses to write a manuscript, or does not respond in a timely manner to requests made during the publication process. Manuscripts written under these

circumstances will not be considered for inclusion in a thesis or dissertation, and will typically result in loss of first-author status.

- **Teaching Assistants.** Typically, graduate students spend their first two semesters as TAs while they take courses and initiate their research. TAs often hold office hours, grade problem sets, and may be asked to cover a lecture or problem-solving session as needed. Some TAs design in-class exercises and/or laboratories, assist students with in-class problems, conduct review sessions, prepare homework solutions, and assist the instructor with grading or other course-related duties. TAs should make every effort to avoid scheduling their own classes at the same time as the class he/she is scheduled to assist. TAs for laboratory courses cannot schedule their own classes during laboratory hours. TAs should consult with the course instructor before registering for their own courses to determine if they are expected to be present during classroom lectures. TAs who are consistently devoting more than 16 hrs/wk to their TA assignment should discuss how to reduce the load with the instructor. If, after meeting with the instructor, the time spent is still more than 16 hrs/wk, the student should discuss the problem with the DGS. TAs should also inform the course instructor and/or DGS if they have a conflict-of-interest (e.g., personal or family relationship) involving a student who is enrolled in the course.
- **Individual Fellowship Applications.** Students with appropriate qualifications are expected to seek out and apply for their own financial support when such opportunities are available. Individual fellowships offer increased flexibility to students and their advisors to pursue a broader range of research activities because of the supplemental funding they provide. The awards also offer prestige to the students, labs, and universities that receive them. However, students must still work within the general scope of their advisor's lab activities and research priorities so that funding can be made available for supplies, equipment, and other research expenses that are not covered by fellowships. Furthermore, it is important to emphasize that students who are supported by individual fellowships are held to the same academic and research standards as students who are supported by research assistantships (RAs), TAs, or institutional traineeships. Even if a fellowship is not awarded, planning and writing a competitive application provides valuable proposal-writing experience to the student. These applications must comply with all University policies and procedures for application of external support, including, but not limited to, approval through the Department, School, and the University extramural funding transmittal process. The DGS and Department grant administrator will advise and assist in the transmittal process, and students should consult with them in a timely manner when preparing applications to ensure such compliance.

- **Renewal of Financial Aid.** Students should realize that renewal of financial support is not automatic. Financial support is contingent upon the availability of funding, on academic performance, on adequate research progress, and in the case of service stipends, on satisfactory performance as an RA, TA or trainee. Research progress is based on annual thesis committee updates and regular evaluations by the faculty advisor. Academic performance is based on GPA and on adherence to graduate program requirements. TA performance is based on faculty and student evaluations submitted at the end of each semester. The Department will attempt to fund all continuing students as long as they are in good academic standing and are making satisfactory research progress.
- **Intellectual Property.** Students should be aware that some research activities may have commercial potential. Vanderbilt University has a strong interest in maintaining and protecting these rights. Research results or materials with commercial potential are not to be shared outside of Vanderbilt University without appropriate non-disclosure agreements and/or material transfer agreements in place. These agreements are negotiated through the Vanderbilt Center for Technology Transfer and Commercialization (CTTC). If you have any questions concerning the commercial potential of a laboratory activity, discuss them with your advisor. Further information about intellectual property rights and the commercialization process can be found on the CTTC website.
- **Service.** Success of the ChBE Department depends on service of its faculty, staff, and graduate students. Students should realize that the Department is evaluated on the basis of the quality of our research and the quality of the students that graduate from our program. It is the Department's responsibility to admit students with excellent qualifications, and we expect graduate students to assist us in consistently improving the quality of the program through service to the Department. Examples of service include assistance in mentoring undergraduate students in laboratory projects, assisting less senior graduate students with troubleshooting laboratory problems, assistance with the recruitment of new graduate and undergraduate students, providing laboratory demonstrations to the public, serving on University and Departmental committees, and other non-academic tasks. Many laboratories also expect graduate students to contribute to the laboratory environment by caring for specific instruments, collecting preliminary data for grant submissions, maintaining cell cultures or research animals, dishwashing, etc. Students should consult with their advisor(s) for individual laboratory responsibilities.
- **Safety.** ALL faculty, staff, and graduate students are expected to maintain the highest possible levels of safety within the laboratory environment in regards to hazards, proper waste handling/disposal, and overall lab cleanliness. Vanderbilt

Environmental Health & Safety (VEHS) can be consulted if questions regarding laboratory safety arise.

- **Seminars and Workshops.** Like faculty, graduate students are expected to attend all ChBE seminars. Graduate students should participate in Departmental and student-led seminars by asking questions, making practice presentations for scientific meetings, and paying respectful attention without causing distractions. Students should make an effort to attend PhD dissertation defense presentations given by fellow ChBE graduate students.
- **Academic Progress.** Students are responsible for staying informed of all academic and degree requirements. Students should take initiative for arranging their PhD qualifying exam, scheduling meetings with their thesis committee, and meeting other program requirements. The DGS, graduate program coordinator, and your advisor will track your progress and provide occasional reminders, but it is ultimately your responsibility to make sure you stay on course to graduate. Every student should become familiar with pertinent information contained in the ChBE Graduate Student Handbook, these Guidelines for Graduate Study, and the Vanderbilt Graduate Catalog. Students should consult the Vanderbilt University Schedule of Courses each semester prior to meeting with their faculty mentor(s) in regards to course selection. Graduate students are required to maintain a Vanderbilt graduate GPA above 3.0 (which is necessary for graduation), and ChBE PhD students are expected to maintain a GPA of 3.3 or higher in core courses (which is evaluated as part of the ChBE departmental exam). Students who fall below a Vanderbilt average of 3.0 are placed on academic probation and may be dismissed from the program if their performance does not improve in the subsequent semester.
- **Student Conduct.** Students are expected to behave ethically in conducting their research, as well as in the classroom. Falsification of data, plagiarism, or any violation of the Vanderbilt Honor Code is grounds for immediate dismissal. Students should respect the rights of others in office and laboratory areas by keeping those spaces safe, quiet, and orderly.
- **Communications.** Students are provided with an email account and should check their email daily and respond to urgent matters as soon as possible. Important announcements involving registration, seminars, fellowship opportunities, TA issues, employment opportunities, emergency alerts from VU Police, and other matters are routinely sent via email.
- **Departmental Resources.** The Department will provide students with space appropriate for their work. Typically, first-year students are assigned a desk in an office with other graduate students, consistent with their need to interact with other

graduate students and to meet with undergraduates as part of their TA duties. More senior students will generally move to office space near to the laboratory where their research is conducted. This move often accompanies the transition from TA to RA responsibilities and is consistent with the need to allocate space to incoming graduate students. Computers provided by the ChBE Department are for academic, non-personal use. Students should be responsible for maintaining a professional local environment with minimal disruption to the activities of others. Students should also be mindful of the limited resources of the Department and its research programs when making photocopies, generating computer output, or using laboratory supplies.

- **Resolution of Conflicts.** The ability to resolve conflicts effectively is an important professional development skill that is essential for career success. Moreover, unresolved conflicts can impede progress in any situation, so dealing with conflicts is an important part of maintaining a productive environment. Students who are having difficulty working with other students should discuss this with the laboratory supervisor. Students who have been advised that they are not making satisfactory progress, who are unsure of their role on a research project, or believe they are being treated unfairly should meet with their research advisor(s) to resolve these issues. Students and advisors should make every effort to resolve these matters through direct discussion, recognizing that conflicts often have several dimensions and effective resolution requires empathy and open-mindedness by all parties involved. If the student is not satisfied with the outcome of that meeting, then s/he should discuss the problem with their thesis committee and/or the DGS. If the problem is still not resolved, the student should present their grievance to the Department Chair.
- **Additional Information for Students.** Information for current Vanderbilt graduate students can also be accessed through the Graduate School catalog or online at the Graduate School website (under the link "Info For Current Students"). The website and catalog also provide information regarding Thesis and Dissertation guidelines, Graduation Forms, Registration Instructions, Honor Council information, Travel Grant Application, Change of Address, and additional helpful information.
- **When You Need Help.** If a student is experiencing serious physical or emotional difficulties, s/he is strongly encouraged to share these struggles with the research advisor, their thesis committee, the DGS, or the ChBE Department Chair. The policy regarding leave of absence is set forth in the Graduate School Catalog. Psychological counseling services are available from the University Counseling Center (UCC), and other health services are available through the Center for Student Wellbeing and Student Health Center. Vanderbilt also has Graduate Life Coaches who assist

graduate students and postdoctoral scholars in their academic and professional development. This position was created to support students through individual coaching and group programming around effective time and stress management, resilience, conflict resolution, navigating academic relationships, and juggling work/life responsibilities. Please refer to the Graduate School website for further details, or refer to the contact information below:

Vanderbilt's University Counseling Center: (615) 322-2571

For concerns related to sexual harassment or intimate partner violence:

Project Safe 24-Hour Crisis/Support Hotline: (615) 322-SAFE (7233)

<https://www.vanderbilt.edu/projectsafe/>

Vanderbilt Project Safe staff are available at the Project Safe Center, 304 West Side Row, Monday – Friday, 8 a.m. – 5 p.m

For emergencies:

Vanderbilt University Police: 911 or 615-421-1911

Suicide Prevention Lifeline: 1-800-273-TALK(8255)