

# Outcomes/Expectations for a Successful Ph.D. Student

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*Group Goals – To develop people and perform creative, impactful research on important technical problems.*

1. **Commitment** - I am looking for very serious and ambitious students that place their academic experiences in graduate school as the first priority in their lives ... students that want to be amongst the very best and most effective scientists/engineers in the world in their area of expertise. Effective people are proactive and take personal responsibility for the events in their lives; they clearly identify how they want their life to be and strive hard to achieve their goals. Effective graduate students identify important problems in the world and zealously work toward contributing to their solutions; these are the kind of students I want in my group.
2. **Publications** - Graduate students should publish papers as first author on 6-7 innovative experimental investigations. (the student should be writing very good, well-organized first drafts of their papers near the end of their Ph.D.). Beginning graduate students should co-author a paper as a supporting investigator before the end of their first year in residence.
3. **Original Ideas** - Synthesizing original ideas for lines of investigation is extremely challenging but one of the most important goals that you should have for your Ph.D. You will need to devour the relevant literature and think very deeply about the tools we have available and how we can make a unique and big contribution. The student should have a goal of eliciting 10 or more citations per year on their papers – i.e., work on important problems. The citations acquired by the paper reflect, at some level, the “measureable” quality. We have to put in lots of thinking about how we can make our research of the highest quality on the most important problems. The timing of the research is also very critical ... once the research is finished we want to get the work in press as soon as possible.
4. **Proficiency** - Be a proficient, well-organized experimentalist and instrument designer. Be a good mechanic (be “tool” smart). Set up your apparatus so that it is easy to acquire data and repair but hard to break .... reliability is a huge key to finishing an excellent and scientifically complete study.
5. **Lab Condition** - When you leave with your Ph.D. I would like you to have your laboratory and apparatus in better condition than when you received it. Repair your instrument as needed so that we have maximum versatility and reliability. Arrange your lab so that it is safe, efficient, and clean; we want to be proud to show it to visitors and prospective students. Document new parts that you construct and avoid shoddy workmanship.
6. **Lab Competence** - Be able to construct your own laboratory and supervise/carry out original and significant research. This will require that you understand how our labs work at all levels of detail.

7. **Expert Knowledge** - Have expert knowledge of the literature in your field. Have good training in other areas for scientific broadening. Be able to learn new techniques and science from text books and journal articles so that you can apply these methods to your research.
8. **Professionalism** (lab cleanliness, reporting of progress, laboratory notebook, email etiquette, putting tools away, progress reports for funding agencies, etc.). – Professionalism will greatly help in creating the “lab culture” that we desire and which makes us all better scientists. CBM will also strive his best to be as professional as possible.
9. **Communications** - Become a good communicator (speaker and writer, email, and memos). This is critically important for your future career!

International students will need to work very hard on mastering both spoken and written English. Only English should be spoken in the labs so that students get abundant practice at speaking English. The better the student speaks and writes in English the simpler is CBM’s job. The better we all communicate with one another the more efficient and effective we will be.

10. **Broadness** - Be on top of the other research activities in our group for scientific broadening and to contribute with helpful and creative ideas. Be a “team player” and help other students in our lab be successful. Ask other students for assistance ... don’t reinvent the wheel if it is not necessary.
11. **Be a good mentor** and trainer to the junior graduate students, undergraduate researchers, high school students, etc. that are behind you; such training and nurturing will allow them to assist you more expediently. Being a good mentor takes purpose and practice and you will be involved in this activity the remainder of your career.
12. **Leadership** - Become a leader in our laboratory and further develop your leadership skills. There are several ways to be a leader ... technical leadership, exemplary professionalism, accountability and productiveness, increasing safety in our labs, etc. Directly below are some more specific suggestions regarding leadership:
  - Leading Change** - Develop abilities to bring about strategic change, both within and outside our group, to meet your personal and our group goals. Assist in establishing a research group vision and implementing it in the continuously changing environment our world presents.
  - Leading People** - Involves leading people toward meeting the multi-faceted goals of our group. A portion of these goals include fostering an inclusive workplace that promotes the development of others, facilitates cooperation and teamwork, and supports constructive resolution of conflicts. These goals also include scientific/engineering excellence, productivity, and creativity.
  - Results-Driven Leadership** – Demonstrate your ability to meet our organizational goals and research expectations. Includes the ability to make decisions that produce high-quality results via application of technical knowledge, problem analysis, and calculated risk.
  - Build Coalitions** - Learn to build coalitions and collaborations both within our group and with other research enterprises in order to achieve common goals.

13. **Conference Presentations** - Attend national science/engineering conferences and competently present (both orally and in poster form) the results from your research. Attending a conference is a privilege one earns through hard work and the acquisition of promising research results. Travel funds are difficult to acquire and will be expended on the most deserving students.
14. **Foster relationships with senior colleagues**, e. g., with committee members, collaborators, etc. so that you have an army of mentors that can write “strong” letters of recommendation for you in the future. Almost all students ignore this important activity to their detriment. An easy way to accomplish this objective is to visit your committee members on a regular basis and show them your progress. Every time you write a paper you can take them a copy and spend 15 minutes discussing your progress and recent accomplishments. Bottom line ... you want to have mentors and senior people to remember who you are and your hard-earned accomplishments. Have your cv up to date at all times.
15. **Funding** - Assist C.B.M. in writing grant proposals to acquire funding. Have an appreciation for the funding and where it comes from. Highly cited papers from our group greatly assist in acquiring future funding and demonstrate to the funding agencies (and the tax payers of the U.S.) our sincere efforts to use the money well and conscientiously.
16. **Teaching Assistant** - I would like for the teaching assistant for every course that I teach [typically one in fall and one in the spring] to be a graduate student from my research group. This helps me enormously! I may have to ask a student from our group to help me with this who has already satisfied their formal departmental TA requirements.
17. **Safety** - Safety should be foremost on your mind while in the laboratory! We don't want you to get hurt and we don't want anyone else to get hurt. We expect you to follow our safety guidelines and to help promote safety within our group.
18. **CBM Letter of Recommendation** - I take letters of recommendation very seriously and when I write one for you I will report upon your performance with regard to all of the topics shown above. In these letters I am expected to comment on your research productivity, professionalism, writing and speaking skills, experimental expertise, drive and determination, scientific creativity, leadership potential, and where you rank in our research group.
19. **Check our web-site occasionally for updated versions of this document.** Questions regarding the content of this document are encouraged by CBM.

## Accomplishment Schedule

1. Finish course work as early as possible. Hopefully within first three semesters.
2. Pass Ph.D. qualifying exams on first attempt. International students must pass the teaching assistant examination within nine months of arriving.
3. Begin working in the lab (assisting a senior student) as soon as possible – no later than the beginning of the second semester at UT-Austin (immediately after qualifying exams) and if possible during the first fall semester to some limited extent. Be able to use

experimental tools as quickly as possible. All first-semester students will be expected to meet with a research sub-group and make a short presentation each week about some aspect of the science. Senior group members will quiz the student over their knowledge.

4. Be a supporting co-author on a paper before the end of the first year in residence.
5. Learn about additional tools such as SEM, TEM, XRD, etc. during first year.
6. Complete Ph.D. candidacy exam during first summer and no later than the second Fall semester. Composed of research progress to date, knowledge of the literature, and a preliminary research plan about the next project.
7. Complete teaching assistant duty requirements within two years or sooner.
8. Complete and submit first study as first-author in archival journal article before end of second year.
9. Year Three – publish two (or more) studies as first author in archival journal articles. Innovate and think about big problems.
10. Year Four – publish two (or more) studies as first author in archival journal articles. Innovate and think about big problems. Begin providing direction regarding future research and mentoring junior students.
11. Year Five – publish two (or more) studies as first author in archival journal articles. Innovate and think about big problems. Continue providing direction regarding future research and mentoring junior students.
12. Failure to make adequate progress will likely require that the student earn their financial support as a full-time teaching assistant so that additional personnel can be employed to assist in achieving the necessary progress. 55 hours per week is the expected level of effort. Keep hours that overlap substantially with regular business hours so that you can easily interact with CBM and other staff on campus. Students should arrive at school before 10 am each day [if this is not possible notify CBM]. Two weeks of vacation plus the 15 days (25 total days) of holidays are permitted each year.