

# **Expectations of M.S. and Ph.D. Students**

(Updated 2 August 2005)

---

## **Derick G. Brown**

Frank Hook Assistant Professor  
Department of Civil & Environmental Engineering  
Lehigh University

## **Introduction**

---

This document is intended to give my current and potential graduate students (i.e., you) a description of my general expectations during your studies here at Lehigh University. I do this to eliminate any misunderstandings as you work with me and my laboratory.

As a graduate student, you will be spending the next few years immersed in research and study. During this time you will learn how to formulate research questions, you will develop the technical and analytical skills to solve those questions, and you will learn how to communicate your results to a wide range of audiences.

To achieve these goals, you are expected to learn with much greater independence than you have in the past. You will need to do significant background reading on your research topic, enhancing your understanding of both the broad field of study and the specific technical and analytical aspects of your research project. You will develop experimental procedures and protocols to investigate your topic in the laboratory and you will develop mathematical models to both understand the system you are investigating and to interpret your experimental results. Inherent in this independence are the requirements that you must have the ability to learn and adapt; must have the willingness to do what is required to complete the research; and must show initiative, be dependable and be self-motivated.

It is important to realize that it takes a lot of work to earn a graduate degree. Your life will revolve around your research and studies, and most students spend a minimum of 50-60 hours a week working on research. To give you an idea of what characteristics are important to succeed at graduate school, the table on the following page compares mediocre students to outstanding students. Mediocre students are not good researchers and colleagues, and because of this, I only invite students to join my research group if I think they have the ability to be outstanding students.

Finally, don't think graduate school is all hard work and toil. It can and should be one of the best experiences of your life. You will have opportunities available to you that are not available in any other setting; you will make new friends from across the globe; and you will learn, if you have not already, that you can succeed at anything if you put your mind to it.

## **Characteristics of Mediocre and Outstanding Students**

<b>Characteristic</b>	<b>Mediocre Student</b>	<b>Outstanding Student</b>
Work habits	Views research as a “9 to 5” job. Does not come in on weekends, evenings and leaves early Friday afternoons. Takes shortcuts on laboratory experiments because the experiment is “taking too much time.” Only performs experiments at advisor’s prodding.	Uses time efficiently and is willing to work beyond usual business hours, including evenings and weekends, to ensure research is completed in a timely manner and performed to highest standards. Proactively initiates experiments.
Journal reading	Reads only journal articles provided by advisor or other students.	Actively and continuously performs literature searches to independently locate journal articles.
Research hypothesis	Content to work on research hypotheses developed by research advisor or others.	Independently and continuously formulates research hypotheses for both the student’s own project and other projects not directly related to student’s project.
Lab notebooks	Takes general notes, where the notebook acts more as a research diary.	Provides detailed descriptions of work done in the lab. Step-by-step descriptions and observations are recorded so that anyone using the notebook can completely replicate the experiment.
Writing	Only writes when forced by their advisor.	Continually writes, including maintaining updated literature review of pertinent topics, writing journal publications and reports, and developing research protocols.
Publication	Looks at publication as an afterthought to the experiments. Minor effort put forth in developing manuscripts and assumes advisor will rework mediocre manuscripts.	Realizes that publication of research results is paramount, and focuses considerable effort in developing and writing manuscripts. Continuously develops new publication ideas and proactively approaches advisor with potential manuscripts.
Problem solving	Comes to advisor seeking solutions to research problems.	Looks at research problems as an opportunity to grow and learn. Develops potential solutions to problems and discusses them with advisor.
Teamwork	Focuses solely on own research.	Understands that the collective output of the laboratory is a key component of the student’s own success, and therefore willingly assists others in the lab with projects and lab chores.

## **Philosophy of Advising Graduate Students**

---

My main goal in supervising graduate students is to prepare you to be an independent thinker, who is capable of formulating research questions; to be technically capable, so you can identify research questions and develop and implement research plans to address those questions; and to be an effective communicator in disseminating your research ideas and results to the scientific community and general public. I will act as a mentor, collaborator and unrelenting advocate, and in return I expect you to work hard, show continual progress in your research, and be conscientious and strive for excellence. For the most part, my management style is hands-off, where I allow you the freedom to pursue your research without my telling you what to do and how to do it. Inherent in this approach is the expectation that you must be self-motivated; diligent and conscientious; and proactively initiate and conduct your research.

My views on M.S. and Ph.D. degrees differ only in the amount of work required to achieve the degree and in my involvement in laying out the research problem. They are:

**M.S. Thesis** is based on advanced research focusing on solving an engineering or scientific problem, with the problem and solution approach typically defined by me. It often involves writing and submitting a one journal article in a peer-reviewed journal.

**Ph.D. Thesis** represents student's original and independent research that advances the field being studied, and involves the publication of a minimum of three peer-reviewed research articles. The research is conceived, performed, and reported by the student under my supervision.

## **Expectations of Graduate Students**

---

I expect hard work, creativity, ingenuity and honesty from my students. I firmly believe that you can learn more from your failures than you do from your successes, so I also expect a willingness to pursue new ideas without fear of failure. A key requirement to join my research group is that my students must be fluent in English (both orally and written), as a significant portion of research involves presenting and publishing the research and results.

You are responsible for managing and conducting your research to the highest standards. This requires a responsible, independent and professional outlook on your part. I also expect (and demand) that you be ethical in your approach to your research, your studies, and your interactions with fellow students and faculty. I am unwavering in my demand for the highest ethical standards. Examples of unethical behavior include plagiarism, cheating on coursework, and fabricating experimental data. Unethical behavior will result in immediate dismissal from my research group. If you have any questions related to ethics, you should talk them over with me.

I also have an expectation of continual progress and excellence in your research. When you set-out on an experimental series, I expect that you will see it completely and thoroughly through to completion, including analyzing the data and writing up the experimental results. Publication is paramount in research – you can do the best work, but if it is not published, it is meaningless. Given this, continual progress in your research includes publication of results. After your first year at Lehigh, I expect you to develop and submit at least one journal publication per year on your research. This results in at least one publication for M.S. students and a minimum of three publications for Ph.D. students.

I have weekly research group meetings, and all students are expected to take turns presenting their research during these group meetings. This is an excellent forum to gain experience in presenting your research and to obtain feedback from your lab mates. I also meet at least once weekly one-on-one with each of my students to discuss their research and progress.

For students working in my laboratory, safety is vital. When in the lab you must wear long pants, closed-toe shoes, eye-protection, and a lab coat at all times. Safety also involves keeping a neat and clean work area. Glassware must be cleaned and put away after each experiment; solutions must be properly labeled and stored, and they must be disposed after use; and instruments and equipment must be treated with care and cleaned after each use. Cluttered, dirty work areas both pose a safety hazard and lead to poor research. Safety in the lab also includes proper use of chemicals and gases. If you are unsure about how to handle or store certain chemicals you should discuss this with me.

For documenting experiments, I assign laboratory notebooks to all my students and these notebooks remain the property of the laboratory. You are to maintain the notebook such that anyone could read it and be able to completely replicate your experiments. This involves writing down step-by-step protocols for conducting your experiments, notes and observations during your experiments, and summarizing the results of each experiment. These notebooks remain with the laboratory at the completion of your research.

Finally, I ask that all Ph.D. students write and submit, under my supervision, at least one proposal to an external funding agency (e.g., National Science Foundation) during their tenure at Lehigh. This provides an excellent educational opportunity on developing and writing a research proposal and demonstrates to potential employers that you have the ability to develop and formulate research ideas. Writing and submitting a proposal also allows you to give future Lehigh students the same opportunity to perform research and work towards a graduate degree that was made available to you through the hard work of your predecessors.

## **Final Thoughts**

---

As I stated earlier, I only bring in students who have the potential to be outstanding researchers and scholars. Reading this document and following the expectations outlined within will help you achieve this excellence. I highly recommend that you frequently refer to this document during the course of your research and use it for continual self-assessment and guidance.