
The Ph.D. Process

A Student's Guide to Graduate School in the Sciences

Dale F. Bloom
Jonathan D. Karp
Nicholas Cohen

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Preface

The world of a graduate student in the sciences is privileged and wondrous. One is surrounded daily by skillful researchers bustling about confidently doing science—people who are making genuine strides in the understanding of nature, discovering the knowledge that will fill the textbooks of the future. Some of these researchers may be world leaders in their fields; others may be relatively unknown, but on the verge of great discoveries. In this high-tech environment, at the very forefront of knowledge, life is exciting, challenging, and stimulating. Every day can bring new insights, new directions, new revelations.

And here you are, a new graduate student, about to become an important participant in this restricted and extraordinary world. Surely you are excited and thrilled by the opportunity granted you. But you are likely also to be feeling somewhat confused and perhaps anxious at the prospect. Exactly where do you fit in? What is expected of you? What will your daily life be like? What is the best way for you to proceed to insure the successful completion of your education, and future success in your chosen profession?

Your confusion about these issues is understandable. In fact, it may even persist for quite a while after you arrive. Some students never figure it all out, and their careers suffer or never begin. The confusion and uncertainty stem from a peculiar characteristic of graduate school: *the rules of the game are rarely talked about!*

Contrary to what you might be expecting, unless you have a wonderful mentor, you are unlikely to receive explicit guidance as to what you should or should not be doing in grad school. A graduate program has a certain vague and open-ended character. There is no rigid agenda, no circumscribed plan of action, no set timetable. Little is mapped out for you. You will not take any specific courses on how to be a scientist, and no one will stand by you and

teach you all the tricks. How, then, do you learn? Yes, there are some classes that you will be required to take, but will these be your main source of information, and are grades really important? What about research, that singularly most important aspect of graduate school: In whose lab will you work? What will you work on? How do you gain expertise? Who can help you? How hard do you have to work?

Logical reasoning, critical analysis, scientific writing, public speaking, networking, and other such skills are also elements to be mastered during graduate school, but how are they perfected? There are so many components to a graduate education, but which ones are critical for future success, and deserve most of your energy and time? What decisions can make or break your career? Keep in mind that graduate school is not an experiential extension of undergraduate education, where the passing of a sufficient number of courses guarantees one a degree. Nor is it medical school or law school, where a delineated and set curriculum gives order, structure, and time limits to the educational experience. This is graduate school in the sciences, where each student in the program has a different experience, learns different skills and different information, and finishes at a different time; where poor choices can delay the degree by years; where you are relatively free to use your time as you see fit; and where you will sink or swim, depending upon *your own interpretation* of how the system works. It can be startling. Self-discipline and self-initiative rule—you are pretty much on your own, as you will soon find out.

The purpose of this book is to provide you with some insight into this novel system, insight that will help you succeed and make the most of your graduate years. The contents are what a “best friend” would tell you about graduate school and how it should be approached. We describe and explain the “rules of survival and success,” for although generally unspoken and cloaked, “rules” they surely are; we believe that many of those who eventually drop out of a graduate program or fail to succeed, just never “got it.”

Also described is the daily experience itself: the research, classes, seminars, journal clubs, lab meetings, interactions with peers and professors, manuscript preparation, qualifying exams, professional meetings, oral exams, dissertation preparation, and other elements that comprise this necessarily compulsive existence. Anxiety, frustration, and joy—all normal responses to a grad student’s life—are also examined. So, too, are the special

problems of foreign students who are strangers to our culture and educational system.

An important part of this book is the inclusion of quotes about graduate school (obtained via questionnaire or personal interview) from numerous people across the country in a diversity of scientific fields, who have been through the process or are now going through the process—professors, scientists in industry, postdoctoral fellows, and current graduate students. These people describe their own experiences and emotions, and offer advice on the variety of challenges and circumstances that constitute graduate school in the sciences. (Unless otherwise indicated, the university listed under each quote represents the graduate school attended, and not the institution in which the respondents now work. The comments do not reflect upon the university or department denoted, as they are the views solely of individuals, and may not be representative; furthermore, some of the respondents graduated a number of years ago, and departments do evolve.)

This is not a book about science (although some helpful hints concerning particular scientific endeavors are given). If anything, it is a book on the “sociology” of academia, and on graduate education in the sciences in particular. Most of the issues we discuss are timeless, and apply to students of all the sciences, biological and physical. Beginning students have many misconceptions about graduate school and what it takes to succeed there. Once you know how the game is played, once you realize what your advisor is really asking from you, once you are familiar with what your life will be like for the next four to seven years, your graduate experience should be predictable, surmountable, and for the most part, enjoyable! We suggest that you read this book in its *entirety* at an early stage in your career planning, so that you can take steps in advance and make wise decisions as choices arise.

The making of a scientist is a slow and sometimes painful process, and how it happens is neither straightforward nor easily described. But it does happen, over many years, from the subtly combined influence of formal discourse, informal chats, observation, successful and unsuccessful experimentation, error, criticism, and praise. The result of this education is a person who thinks deeply, logically, and especially critically, who is knowledgeable in the area in which he or she works, who knows how to correctly design experiments to test his or her hypotheses, and who is technically proficient enough to carry these experiments out—in short, a scientist.