1 Introduction

Are you interested in an academic career? Would you like to be a professor in a college or university, and particularly a research-oriented college or university? If so, have you wondered how colleges and universities recruit and select their faculty members, or what is required and expected of a faculty member once they have been hired? Also, once embarked upon an academic career path, have you wondered what is expected of a new faculty member in his or her research activities, and how a new faculty member initiates and establishes a research program? Do you know who pays for research that is performed in academic institutions, and how a faculty member goes about obtaining research funding? If your response to these questions is positive and the questions pique your interest, and you would like to obtain more information relevant to establishing an academic career, you have selected the correct book to read! These, and other questions are directly addressed in the following chapters in this book. We'll define our terms, and then go over the different ways academic research attracts funding. We'll explore the differences between public and private financing, and discuss the benefits and drawbacks of different funding vehicles. Hopefully, you'll find some answers that address your personal situation and shed some light onto the procedure and effort needed to establish an academic career.

As you probably know, the life of a university professor can be very rewarding and fulfilling, which may be, at least partly, why you are interested in an academic career. You may have observed faculty members in the performance of their duties and their activities in a college or university you attended, and have been inspired and motivated to pursue a similar lifestyle. You may have pursued a PhD degree with the specific intention of becoming a university faculty member. If so, you are to be congratulated and encouraged, as an academic faculty career is a noble

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and worthwhile endeavor, and you will be contributing to the advancement and welfare of civilization, and the education and training of the next generation.

However, various factors associated with an academic career can be initially confusing, and you probably have some questions regarding how one goes about obtaining and initiating an academic career, and what is expected from a new faculty member. You may also know that an academic career path differs substantially from an industrial or business career path in several significant respects. For example, as a business or industrial employee, particularly in technical disciplines such as scientist or engineer, your job duties and responsibilities will be defined for you, usually through discussions with your supervisor, and you will be, at least initially, working on projects that are well defined for you. As your career advances you will gain more flexibility to define projects, but this ability will always be limited by the requirements of your employer and their needs and interests. In general, you will not necessarily have the flexibility to pursue problems that you personally find interesting, particularly if they don't have immediate relevancy to your employer's goals. You will be paid at a prescribed and determined rate, depending upon your level of experience and job performance. Your performance expectations will be fairly well defined and documented, and your salary will be adjusted periodically based upon your project success and your performance.

An academic career has similar characteristics, primarily for your teaching and committee service duties. However, the situation is dramatically different regarding your research program establishment and development. The expectations for your research activities can be, and usually are, confusing, particularly for new faculty members. Establishing a funded research program effort is very much like starting your own business. In fact, you will basically be an entrepreneur. That is, you personally will be responsible for the identification and definition of the specific research area and topics that you choose to pursue. You will essentially have complete flexibility to pursue any research topic you desire. This is the good news. The bad news is that you will be expected to obtain your own funding to actually

perform the research. Your home institution will provide very little financial support for your research, other than items included when you are initially recruited and hired. Of course, you will also be expected to teach courses, and to serve on academic college and department committees. This is a required obligation, and an expected responsibility of all academic faculty members, although the effort represents a demand upon your time. Unfortunately, these duties often conflict with research program activities. Obtaining funds to support a research effort is a high-priority activity, although extremely challenging, and an activity that will dominate your entire career as a university faculty member. Effective time management is a definite necessity and characteristic of all successful faculty members.

If you've decided to pursue an academic position, congratulations on the beginnings of an exciting and rewarding career. I sincerely hope you find the material in this book informative and useful. If you're reading this book you may have recently graduated with your PhD and are either looking for, or have found, your dream job in academia as a university professor. You may also have graduated in the recent past and have been employed in industry or government, or possibly have worked as a postdoctoral research assistant in an academic research group, and recently began the faculty recruitment process, or perhaps you have accepted a university faculty position. Or perhaps, you've been in academia for a while and are now looking to change your research direction.

Whatever your path to an academic position, you've been involved in and survived, a very intense and competitive process. Securing an academic tenure track position is one of the most competitive processes you'll ever encounter. If you've been recruited to an academic faculty position, you likely have been selected over a large number of competitors, which could number in the hundreds. As a university department head I've been involved in numerous new faculty searches where we've received on the order of up to 100 or more applicants for a single position. Academic faculty opportunities in US academic institutions now typically will attract tens to hundreds of applicants, and from candidates from all over the world. The competition for academic faculty opportunities has dramatically changed over the past three

or four decades. Back in the 1970s and 1980s, for example, many new faculty opportunities at US academic institutions often experienced problems recruiting faculty members. Although there were numerous reasons for this, faculty recruitment difficulties were, at least, partly due to relatively low academic faculty salaries that were paid at the time. Academic salaries lagged significantly behind industrial salaries. However, the situation has leveled in recent decades, and academic faculty salaries, particularly in engineering and science disciplines, but also in disciplines such as business, marketing, communications, etc., now have relative parity with industrial and government pay scales. Academic faculty positions are very highly desired, and new faculty searches at most major universities have become very competitive in recent years. If you've secured a tenure-track academic faculty position, you are to be congratulated! You've survived a very intense process and have positioned yourself for a life in academia, which, quite frankly, can be a very enjoyable and satisfying lifestyle, while contributing to further discovery and passing this knowledge on to the next generation.

While you bask in your current success, you need to focus upon the next step in the process, the one for which you were primarily hired. Unfortunately, this is also the challenge for which you're probably the least prepared. As a PhD student you've been mentored and worked under the direction of your advisor, who may have had the responsibility of securing your funding while you worked on your research on projects for which your advisor wrote a successful proposal and received funding. You're now faced with the goal of building a successful research program on your own. You'll find that moving from one side of the desk to the other can be daunting, particularly since you probably don't yet have a lot of contacts in funding agencies and, in fact, may not even be aware of where to look. You're faced with the challenge of obtaining funding to support your research, to recruit students, and, of course, to teach classes, which, if you're lucky, will involve developing courses that support your research area. You'll find that you have an incredible amount of freedom to basically pursue whatever you want to pursue, but you also have the responsibility to obtain the necessary funding. When young faculty members fail, it's generally because of their inability to

properly manage the freedom and flexibility afforded by an academic career. It's a very time-intensive process to identify and make the connections with funding agencies and the appropriate program managers that will support your research. It takes a lot of time to decide which research topic to pursue and determine how to write a proposal that will be successful in being funded.

During your recruitment process you've most likely been wined and dined and promised all sorts of help, mentoring, and advice. Most of this has been promised in a spirit of helpfulness and understanding of the challenge you face. After all, the people that just hired you have also gone through the process and survived. They know the difficulties you face. An increasing number of universities offer detailed mentoring programs that will help you become aware of funding opportunities, and many now offer proposal-writing workshops. By all means, attend as many of these as possible, for it's not possible to get too much advice. However, be aware that most of these mentoring workshops are presented from the university perspective. They may include topics such as identifying potential sponsors, how to write an effective proposal, university procedures and policies, pre-award and post-award procedures, etc. While this information is pertinent and of much use, it doesn't address the more important question of what a program manager will find worth funding. In an era of reduced research funding and an expanding base of faculty members seeking research funding, the competition for research funding has become more and more competitive. Funding rates at most funding agencies have been on a continuous decline over the past 20 years or so, and generally are no larger than 20% to 25% or less for most opportunities. In order to be successful in this environment, it's increasingly important to "tune" your proposal to the topics in which program managers have interests. Therefore, you need to learn what they're looking for and what they want to support. They have limited available research funds, particularly for new program starts, and are very selective in which new programs they choose to fund. You want to be one of them!

The purpose of this book is to help you in your quest. The book is written from the perspective of an experienced government program

manager, and the book presents inside information on how to make contact with an appropriate program manager or program director, and to understand what they are looking for in proposals that are submitted to them. You need to learn and understand how to identify the research areas and projects that they support, and how you can fit into their program. Although the elements of proposal writing are discussed in Chapter 7, the main thrust of this book is not to specifically address the mechanics of how to write a proposal; this type of information is readily available in numerous other sources, but rather, to address the more important question of what subject to address in the proposal, and how to direct and "tune" your proposal to a funding opportunity, as well as how to get your proposal in the hands of a receptive agency and the appropriate program manager. This is the first step in building a successful research program and will set the course for future success. This type of information is not readily available elsewhere.

In the following chapters in this book, we'll address both the issues associated with the search for an academic faculty position, and the basic principles of building an academic research program. We'll discuss how to go about setting up an academic research program and what to ask for and negotiate in a start-up package. We'll then discuss the sources of research funding and how to identify the appropriate funding agency for your research, as well as how to go about making contact with the proper program manager. I'll describe what program managers and program directors in US government funding agencies are looking for in new researchers, and how you go about shaping your research to fit into their programs. Hopefully, this information will give you a glimpse into the thinking of program managers.

Chapter 2 starts with a brief overview of research funding history in the United States. We'll discuss the reasons the US government provides research funds to academic institutions, and why a variety of funding agencies exist. We'll also discuss funding trends over time, and indicate some emerging areas of research. Chapter 3 digresses from the question of how to work with funding agencies to discuss the academic faculty search process, what is expected of a new faculty member, and how to negotiate an appropriate start-up package that includes university

supplied resources that will be required to initiate a research program. This information is primarily intended for those just starting to search for a faculty position, and the seeds for a successful academic career are often sown in the process of negotiating the resources that will be provided at the beginning of academic employment. New or established faculty members that have already accepted or hold a faculty position can skip this chapter, and proceed to the rest of the book, which is directed towards describing the procedures involved in obtaining the funding necessary to build and sustain an academic research program.

If one is to be successful in raising research funds, there is significant salesmanship involved. This issue is addressed in Chapter 4, where we discuss the best approach to presenting your ideas to a program manager and how to convince them that they should support your research. Chapter 5 discusses the issue of how to identify the most appropriate grant funding agency to approach for research funding. The various US government funding agencies, and the areas of research they support, are discussed. Also, the legal instruments that are used to transfer research funds from the funding agencies to research performers are explained and defined. The very important question of how to identify and make contact with the appropriate program manager or program director that may be interested in funding your research is addressed in Chapter 6. The best and most effective means for making contact with program managers and program directors are presented and discussed. Suggestions are offered regarding both how to identify and communicate with an appropriate program manager or program director, as well as how best to approach them, and learn what research topics they have the most interest in supporting. Also, the best approaches to gain their interest in your research are discussed. I'll give you some tips as to how to sell yourself.

The elements of a well-written proposal are discussed in Chapter 7. I'll explain the process by which you can elicit feedback regarding your proposal, and how you can work with your program manager to revise and refine your initial ideas. The NSF PECASE program proposal has some fundamental requirements that differ from a standard research grant proposal. For this reason, the PECASE proposal is separately

described in some depth. Chapter 7 ends with a discussion of what to do if your proposal is declined, and how you can learn from the process to improve your next proposal. The book concludes with a brief discussion of some cautions, concerns, and restrictions that are associated with performing research on certain topics and information identified by the US government as "export controlled," which requires that certain actions be taken to limit access by foreign individuals or organizations. In particular, the items and information that are identified as sensitive may be restricted under the ITAR and EAR restrictions, which are explained in Chapter 8. This may also include some restrictions associated with working with international students, and in traveling to present the results of your research in international conferences, workshops, and meetings with foreign individuals and organizations. We'll define these regulations and explain their meaning and how they affect your research.

I sincerely hope you find the material and information in this book useful. As I stated, the information is derived from many years' experience working on virtually all sides of the academic research enterprise. I hope the information in this book represents the best course you never took in grad school.

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