# Getting into Graduate School in the Sciences

## A Step-by-Step Guide for Students

Are you applying for graduate school and feeling overwhelmed by the choices available to you and the complexity of the application process? This informative and humorous guide for life and earth science students offers comprehensive advice to help you prepare and increase your chances of success. Adopting a step-by-step approach, you will be guided through the entire application process, from undergraduate preparation and choice of graduate program, to funding, applying, scheduling a visit, and finally deciding which offer to accept. Based extensively on a comprehensive survey of graduate admissions programs across the United States, the advice offered is evidence-based and specific to the natural sciences. This jargon-free text ensures that prospective students are well prepared and make best use of all available resources to convince graduate programs and advisors that you are the best candidate.

**S. Kersey Sturdivant**, Ph.D., is a marine scientist who specializes in human disturbance of the benthic environment. He is a faculty member at Duke University, USA and helped establish an environmental consulting company, INSPIRE Environmental, which focuses on environmental impact assessments of the seafloor. In his spare time he blogs about science at SouthernFriedScience.com, and you can follow him on twitter @Wormcam.

**Noelle J. Relles**, Ph.D., is a marine scientist who specializes in landscape mapping of coral reef habitats. She received her doctorate at the College of William & Mary's Virginia Institute of Marine Science where she studied Caribbean coral reefs and marine policy.

# Getting into Graduate School in the Sciences

## A Step-by-Step Guide for Students

**S. Kersey Sturdivant**
Duke University, USA
INSPIRE Environmental, LLC

**Noelle J. Relles**
The State University of New York at Cortland, USA

CAMBRIDGE UNIVERSITY PRESS

CAMBRIDGE
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781107420670



First published 2017

Printed in the United Kingdom by Clays, St Ives plc

*A catalogue record for this publication is available from the British Library*

*Library of Congress Cataloguing in Publication data*
Names: Sturdivant, S. Kersey, author. | Relles, Noelle J., author.
Title: Getting into graduate school in the sciences : a step-by-step guide for students / S. Kersey Sturdivant, Noelle J. Relles.
Description: Cambridge, United Kingdom: Cambridge University Press, 2017. | Includes bibliographical references and index.
Identifiers: LCCN 2016026764 | ISBN 9781107420670 (paperback)
Subjects: LCSH: Universities and colleges – United States – Graduate work – Admission. | Universities and colleges – United States – Entrance requirements. | Science – Study and teaching (Graduate) – United States.
Classification: LCC LB2371.4.S79 2016 | DDC 378.1/55–dc23
LC record available at https://lccn.loc.gov/2016026764

ISBN 978-1-107-42067-0 Paperback

*This book is dedicated to our most awesome friends from graduate school (CFelts, Lynn, Asheley, Spoon, Fozzi, Aaron, & Double D), who showed us how to love you, love life, 24/7!*

# Contents

# Preface

"Opaque," "deceiving," "exciting," "tedious," "match-making," and "purgatory." These are just a few of the terms that have been used to describe the graduate school application process, and these varied responses provide an indication of just how innately unique the graduate school application process can be for the natural sciences. Graduate school is itself a curious yet often rewarding intellectual journey of an individual's pursuit to further their mastery in a specific discipline. Curious in the literal sense, as students attempt to elucidate unknowns within their field of study, but also figuratively, because often a student's progress toward graduation (or lack of it) can be perplexing. Before you can experience this journey you must first surmount the most obvious hurdle, graduate school acceptance, which can be a deceptively awkward and tricky proposition. This is particularly true in the natural sciences (which encompasses the earth and life sciences) where students are vying not just for the approval of their prospective graduate institutions, but often also that of a major professor; an underlying uniqueness about graduate school in the sciences, that differs from graduate school in business, law, or medicine. In order to achieve acceptance, there are a number of seemingly obvious, but also many cryptic tactics that a student can employ. The purpose of this book is to ensure that you, as the

prospective student, are well prepared, and knowledgeable of all the resources at your disposal, so that you can convince graduate programs and advisors that you are indeed the best candidate.

This book achieves this goal by taking a step-by-step comprehensive approach that marries humor with empiricism. We have surveyed hundreds of graduate programs in the natural sciences and used the information we gathered from these programs to derive the conclusions in our book, and provide systematic suggestions of how applicants can best position themselves for acceptance. As a result, this book is more than just instructional anecdotes, but provides a window into the thinking of graduate admissions offices. Our survey was completed by 235 natural science graduate programs in the USA, and received responses from a large portion of the top Institutes of Higher Education (IHE) in the USA. Respondents consisted of 4 of the 8 Ivy League universities, 135 R1 programs (research-focused IHE), 72% of the top 25 IHEs, 74% of the top 50 IHEs, and 73% of the top 100 IHEs. Broken down by discipline, 37% of respondents were from biology (typically life sciences programs), 29% were chemistry, 21% were physical science, and 13% were environmental science. Some of the IHEs requested acknowledgment and can be found in the acknowledgments section.

An important note regarding the survey and presentation of results as you read through this book. Some simple statistics are used to explain and signify the importance of the results obtained from our national survey of graduate programs. To enable a quick understanding of what analyses were conducted and what they mean, we briefly provide a description. After surveying hundreds of graduate programs in the natural sciences, the programs were divided into various groups to assess if there were differences in responses by programs (e.g. life vs. earth sciences, top 100 vs. other, research 1 vs. non-research-focused programs). As a result of these distinctions, occasionally the results presented in this book contrast the average responses between the aforementioned groups to highlight similarities/differences. Differences are considered significant (i.e. the variation or the differences between observation is real and worthy of attention) if the p-value is less than 0.05. To

indicate these differences, p-values less than 0.05 are presented as an asterisk (*). Numerous asterisks indicate the severity of significance, e.g. $p < 0.005$ (**), and $p < 0.0005$ (***).

In this book, we briefly discuss course selection and preparation during the undergraduate career, but specifically outline the graduate school application process from the initial application to acceptance into a program. We also include specific discussions geared toward students who are applying to graduate school after taking time off between undergraduate and graduate school, international students, and students from underrepresented groups.

This book is designed as an informative and humorous "how-to guide" for undergraduate students and postgraduates. It provides information and guidance on applying to USA-based graduate schools, for research and thesis-based program in the natural sciences, as opposed to a clinical program or non-thesis study. The natural sciences are branches of science that strive to elucidate the rules governing the natural world through the use of empirical scientific methods; empirical denoting information garnered through observation or experimentation. The list of disciplines that this book covers (illustrated below) is by no means meant to be exclusive, but is representative of the graduate program structures definitively covered by this book. It is very likely that the advice provided in this book covers many aspects of graduate programs not included on this list (e.g. social science programs that focus on human-environment dimensions). The following is an inclusive list of natural science graduate programs:

| | | | |
|---|---|---|---|
| Anatomy | Animal behavior | Atmospheric science | Biomedical science |
| Biochemistry | Biodynamics | Bioinformatics | Biology |
| Cell biology | Chemistry | Developmental biology | Earth science |
| Ecology | Environmental science | Evolutionary biology | Evolutionary genetics |
| Genetics | Geology | Immunology | Marine science |
| Microbiology | Molecular biology | Neuroscience | Oncology |
| Parasitology | Pathology | Physics | Physiology |
| Plant sciences | Structural biology | Systems biology | Zoology |

Most books written about graduate school do a poor job of detailing the application process for students interested in studying the natural sciences. The books are either not based on thesis/research programs, not focused on natural sciences students, ignore nontraditional students, are outdated, are solely opinion-based, discuss other aspects of graduate school more specifically, do not mention the importance of establishing an advisor/advisee relationship, or, more commonly, a combination of these characteristics. Our book addresses a lack of instructional preparation for graduate education in the natural sciences, and attempts to do so empirically and lightheartedly with input from hundreds of ranked graduate admissions programs around the USA. While many students realize the obvious necessity of maintaining a high Grade Point Average (GPA) and scoring well on the Graduate Record Examination (GRE), these facets make up only a small portion of the qualities and requirements that increase the probability of acceptance into a graduate program. For example, many students may not realize the weight placed on establishing a relationship with potential advisors and the awkwardness of attempting to establish said relationship with a revered scientist one has never met; our book will include helpful tips to navigate and establish rapport despite this uneasiness. Also throughout this book, when referring to a major advisor, a few terms are used that are synonymous. Major advisor can also be described as an advisor or Principal Investigator (PI).

Additionally, this book will take time to focus on women and minorities in science. Science has been traditionally a Caucasian male-dominated discipline, but in recent years the presence of women and minorities has grown. A number of funding opportunities exist solely for these groups, and our book will discuss how to take advantage of these prospects to further the likelihood of acceptance into a graduate program. In addition to specifically addressing women and minorities in the application process, as needed, each chapter will include a section directed at international students applying to graduate school in the USA. There are extra steps that international students will need to take care

of with regard to applying, such as having transcripts sent as part of the application package and traveling internationally to visit potential schools. International students will also need to give special consideration to relevant deadlines and the availability of funding for non-US citizens.

Finally, as you go through your graduate school application process try to keep in mind two important things: 1) While it is a daunting endeavor, try and have fun. When applying to graduate school you will have the opportunity to engage with some truly interesting people, as well as some very awkward ones, many of whom will be esteemed (or headed in that direction) in their specific careers. Use the opportunity to hone your skills in developing the best way to "sell" yourself, as this is a trait you will have to call on throughout your career. Also enjoy the visits, as they will sometimes provide the opportunity to visit a place you have never been to before, and to interact with people you may never see again. 2) This book IS NOT the Bible. That is to say, this is not Zombie Land, and these are not rules to live by. Please remember that this book is providing guidance and advice based on the average experience, but in the end, you need to take what you learn from this book and apply it to your own specific circumstances. A lot of the advice provided in this book can and should be taken as it is literally stated, but please use common-sense logic when taking into account some of the advice offered. The only universal truth is that each person's experiences will undoubtedly differ, and as a result everything in this book cannot be directly translated to your experience. With that … let's begin!

# Acknowledgments

There are a large number of people and entities to thank for support in allowing this book to come to fruition. Each are listed on the next page, but we wanted to take time to extend a special thanks to a number of people who had a large supportive role, and without such help, would have made completion of the book far more difficult. First and foremost, we want to extend a big thank you to Dr. Roger Levine. He was critical in helping us develop and implement the nationwide survey of graduate programs, and freely provided his time and expertise in analysis of the massive data we received from the survey. We would also like to thank all of the current and former editors at Cambridge University Press (Martin Griffiths, Victoria Parrin, Ilaria Tassistro, and Katrina Halliday) for their help in developing this idea; with a special thanks to former Cambridge University Press editor Martin Griffiths for initially believing in our project idea and for his effort to get the project commissioned. We also want to thank the anonymous domestic and international reviewers of our book proposal. Each reviewer provided a fresh perspective and challenged us to think about how we developed and presented the book in a way that has resulted in what we believe is a great product. We owe a lot of gratitude to Kate Sturdivant Gibson, Esq., who served as our legal advisor

free of charge, and helped us navigate the numerous intricacies of contract negotiation and language.

We want to thank Megumi Sutherland (formerly Shimizu) and Catalina Pimiento for providing great background information about international students, and whose initial insights allowed us to develop questions and ideas to ask others to enable a more comprehensive understanding of the perspective of international students regarding graduate application. In that vein, we would also like to thank Steven Baer and Morgan Gopnik for their perspectives about nontraditional students applying to graduate school, the foundation of which allowed us to formulate more official questions to ask a larger body of nontraditional students. We would like to thank Caleb C. McKinney and Lauren Wyatt for their insight into graduate programs that use a lab rotation for matching graduate students with major advisors, and we would also like to thank Lynn Wilking and Cherlynn Clarry for proofreading early drafts of many of the chapters.

We also want to provide a big thanks to Duke University and the National Science Foundation OCE-PRF who provided support to allow Dr. S. Kersey Sturdivant to work on this project. It is important that we acknowledge the Virginia Institute of Marine Science, College of William & Mary (where we both attended graduate school) and our former graduate advisors Drs. Robert Diaz, Rochelle Seitz, and Mark Patterson for our wonderful experience in graduate school, which is where we initially conceived producing this book so many years ago as officemates. We'd also like to thank all of the graduate admissions committees who took part in our survey, allowing for the crucial empirical aspect of this book, rather than relying on our own anecdotal advice, and the graduate students who contributed anecdotes about their graduate application experience. Finally, we want to extend a big thanks to our family and friends who have supported and championed us over the years as we have worked on this book, and motivated us through the highs and lows of putting together such a large, comprehensive, and empirical text, with a special consideration for Dr. Noelle Relles' husband, Aaron Relles.

We thank the following people and graduate programs (those that chose to be listed) for their assistance with this book, either through the advice they provided, anecdotes of their graduate school experience, or participation in surveys from which we derived our empirically based advice:

Roger Levine – Aaron Relles – Martin Griffiths – Victoria Parrin – Ilaria Tassistro – Katrina Halliday – Kate Sturdivant Gibson – Megumi Sutherland – Catalina Pimiento – Steven Baer – Morgan Gopnik – Caleb C. McKinney – Lauren Wyatt – Lynn Wilking – Cherlynn Clarry – Robert Diaz – Mark Patterson – Rochelle Seitz – Iris Anderson – Zach McKelvey – Chris Ward – Tiffanny Newman – Andrew Thaler – Jenna Spackeen – Corina Antal – Shelby Rinehart – Savannah Volkoff – Tracy Clarry – Amy Donate – Ryan Huang – Tara Catron – Laura Macaulay – Auriel Fournier – Leah Zullig – National Science Foundation – Southern Fried Science – Nicholas School of the Environment, Duke University – Virginia Institute of Marine Science – College of William & Mary – Department of Biological Sciences, Northern Illinois University – Department of Physics and Astronomy, University of Maine – Department of Chemistry, University of Maine – Department of Chemistry and Chemical Biology, Rensselaer Polytechnic Institute – Department of Ecology and Evolutionary Biology, University of Kansas – Department of Biology, University of Central Florida – Tulane University – University of Nebraska-Lincoln – Department of Biological Sciences, Duquesne University – Department of Biological Sciences, University of Delaware – Biological Sciences, University of Maryland Baltimore County – Department of Chemistry and Biochemistry, The University of Toledo – Department of Biology, University of Iowa – Department of Physics, Ohio State University – Graduate School at Georgia Regents University.

# Abbreviations

| | |
|---|---|
| AAAS | American Association for the Advancement of Science |
| CA | California |
| COL | Cost Of Living |
| CV | Curriculum Vitae |
| EPA | Environmental Protection Agency |
| ETS | Educational Testing Service |
| FY | Fiscal Year |
| GPA | Grade Point Average |
| GRE | Graduate Record Examination |
| GRF | Graduate Research Fellowship |
| GSA | Graduate Student Association |
| ID | Identification |
| IHE | Institute of Higher Education |
| IELTS | International English Language Testing System |
| NGO | Non-Governmental Organization |
| NIH | National Institutes of Health |
| NOAA | National Oceanic and Atmospheric Administration |
| NSF | National Science Foundation |

| | |
|---|---|
| NSF GRFP | National Science Foundation Graduate Research Fellowship Program |
| NSF OCE-PRF | National Science Foundation Ocean Sciences Postdoctoral Research Fellowships |
| PC | Personal Computer |
| PI | Principal Investigator |
| RA | Research Assistantship |
| REU | Research Experience for Undergraduates |
| SAT | Scholastic Aptitude Test |
| SD | Standard Deviation |
| SUNY | State University of New York |
| TA | Teaching Assistantship |
| TOEFL | Test of English as a Foreign Language |
| TOEFL iBT | Test of English as a Foreign Language Internet-Based Test |
| TV | Television |
| URL | Uniform Resource Locator |
| VA | Virginia |