

1 **Title:** Demystifying the graduate school application process

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16 **Abstract**

17 Navigating the graduate school application process is often challenging, requiring intricate
18 knowledge of academia and graduate institutional structures. This “Hidden Curriculum of
19 Academia” includes what different graduate degrees offer, how to connect with a faculty
20 member of interest, and the skills needed to submit a “competitive” application. We hope to
21 demystify a portion of this hidden curriculum by focusing on the process of applying to graduate
22 school in research-oriented science programs. This article provides an overview of graduate
23 school, the application process, how to prepare for it, and potential career paths to pursue
24 following a Master’s or Doctoral degree. Our work contributes to the larger literature that aims to
25 increase the transparency of academia and create a more diverse, equitable, and inclusive space.

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27 Key words: graduate school, hidden curriculum, ecology, EEB, JEDI, graduate school
28 application

29 Introduction

30 Graduate school presents a variety of unique challenges, especially for those from marginalized
31 and oppressed backgrounds (see Berhe et al., 2022). Yet, before individuals even enter graduate
32 school, they must surmount the hurdle of the application process. Success in this process, similar
33 to most success in academia, lies behind a wall (sometimes referred to as an “invisible barrier”
34 (Gardner & Holley, 2011). Over this wall, one finds what is commonly referred to as the
35 “Hidden Curriculum of Academia.” Here you learn, for example, how to contact faculty
36 members for research positions, what skills you should be building prior to applying, how to
37 develop strong proposals and grants, and where to find funding. This knowledge, and the
38 associated skills, are foundational to success in graduate school and, more broadly, academia.
39 Generally, this information is passed on through – and between – academic lineages (i.e.,
40 between labs or faculty members to postdocs and graduate students), making the process
41 daunting for those who have either not established a strong faculty mentor, do not feel
42 comfortable approaching a faculty member, or are not yet part of a research lab. Thus, the
43 exclusivity in access to these resources via mentorships, exposure, and other research-related
44 experiences prevents the success of all individuals interested in graduate school for research-
45 oriented science programs. This likely plays a significant role in the demographic makeup of
46 graduate students in the United States and, consequently, the makeup of those who further pursue
47 tenure-track positions in academia.

48

49 Many potential graduate students from marginalized backgrounds are barred from applying
50 and/or being accepted into graduate programs by a lack of understanding, or complexity, of the
51 process, which is common for pursuing higher education generally (Gardner & Holley, 2011;

52 Ramirez, 2011). This feeling is likely exacerbated in graduate programs that are more complex
53 than a simple “apply and wait,” such as non-rotation research-driven science programs. Although
54 this hidden curriculum for graduate programs is not the sole reason for disparities in the
55 representation in academia (e.g., racialized experiences (McGee & Bentley, 2017)), it continues
56 to prevent academia from becoming a more just, diverse, equitable, and inclusive (JEDI) space.
57 Access to resources is important for transparency in how academia works and is especially
58 relevant for groups such as first-generation students (Gardner & Holley, 2011).

59
60 In this article, we aim to provide those interested in graduate school with a general understanding
61 of the graduate school application process to increasing the success of applicants from
62 marginalized backgrounds. Individual steps for a successful application will vary by the potential
63 faculty advisor, graduate program/department, advisor, and institution. Here, we discuss (1)
64 graduate school and considerations to make before applying, (2) the process of applying to
65 graduate school, including finding a lab and crafting statements, and (3) career paths available
66 for those who pursue graduate school, with distinctions between positions available with
67 Master’s degrees (M.S.) and Doctoral degrees. We conclude by briefly discussing how this
68 article may benefit JEDI efforts and provide a table of resources useful for undergraduates
69 considering graduate school. Additionally, we include a compact version of this paper as a
70 supplemental flyer (Supplemental Material 1).

71

72 **What is graduate school and how do you set yourself up for it?**

73 While “graduate school” can encompass everything from professional degrees (law, medicine,
74 business) to academic degrees (M.S. and Ph.D.), we focus this article on the latter. M.S. are

75 generally 1-3 years and are started by students anytime after they receive their undergraduate
76 degree, with some students opting to begin immediately after obtaining their undergraduate
77 degree and others opting for taking some time between degree programs. At some institutions,
78 opportunities for joint undergraduate and M.S. programs at an accelerated rate are available.
79 M.S. degrees can be research- or course-focused, depending on your discipline and the university
80 department. It's worth noting that M.S. degrees are a requisite for starting Ph.D.. programs in
81 many countries. However, in the United States graduate school system, M.S. are often (but not
82 always) optional prior to starting a Ph.D.. For students with research experience and a vision for
83 what they intend to study but not a M.S. degree, going straight to a Ph.D.. is possible. Ph.D.
84 degrees, in contrast to M.S. degrees, are always research-focused. These degrees vary widely,
85 taking anywhere from 3 to 8 years (or longer!) depending on the country, discipline, university,
86 etc.

87

88 *Deciding whether Graduate School is the Right Next Step*

89 Graduate school is a thrilling experience – it allows you to spend your time delving into a topic
90 of interest to you within a community of other researchers with whom you can collaborate and
91 learn. At the same time, it is also a challenging experience in which you will surely have both
92 successes and failures. And it is time-consuming; once you decide to enter into a graduate
93 program, there is a long process before you are complete. This should not daunt you, but
94 suggests the importance of carefully considering the motivation for entering in the first place.

95

96 The first thing to consider is why you want to go to graduate school. To do this, you should
97 consider your career plan – a M.S. or Ph.D.. is required for some positions, while a graduate

98 degree over-qualifies you for other positions. See the “Examples of Career Paths” section for
99 more information on what you can do with a graduate degree. You should also think about the
100 timeline and lifestyle to determine whether this is something you can afford mentally and
101 financially. Finally, you should think about what you want to gain from graduate school – a M.S.
102 degree provides you with the scaffolding to apply the skills, while a Ph.D. sets you up to
103 determine research directions.

104

105 *Undergraduate vs. Graduate Degree*

106 After completing your undergraduate degree, you may wonder if going to graduate school is
107 right for you. And if not now, then when? A major question to ask yourself to help understand if
108 pursuing graduate school is right for you is: “what can I accomplish with my undergraduate
109 degree for my career, and am I satisfied with that?” The core difference between an
110 undergraduate degree (i.e., Bachelor’s) and a graduate degree (i.e., M.S. or Ph.D.) is the post
111 graduate opportunities opened up (or removed) when the degree is earned. For example, in a
112 museum, you may be able to be an assistant rehabilitator or a zookeeper with your Bachelor’s
113 but to conduct and lead research, a M.S. or Ph.D. is likely required. Because pursuing a graduate
114 degree is time-consuming and requires an investment (see “*Earning a M.S. vs. Ph.D. Degree*”
115 below), it is worth having a general long-term plan that includes your general career of interest
116 before committing to a graduate program.

117

118 When you have a general idea of the career you are interested in, or the exact position you want
119 to pursue, it is useful to find individuals that are in that position or career via google or other
120 avenues such as Twitter. You can then look into what degree they hold or send an email to ask

121 more about educational requirements for the position. In addition to locating specific people
122 working in the position you are interested in, you may find it useful to browse job boards (e.g.,
123 USAJobs, Texas A&M Wildlife Job Board); you can then examine the job requirements for
124 positions of interest. Perhaps the position you thought required a Ph.D. only recommends having
125 one, or asks for a M.S. instead. During this time, you may also find other positions that spark
126 your interest and only require a Bachelor's degree.

127

128 *Earning a M.S. vs. Ph.D. Degree*

129 Once you decide that graduate school is right for you, you need to determine what degree you are
130 interested in earning. No single answer is “best;” the decision depends upon your desired career
131 path, interest in research, funding availability, and timeline (Clark, 2021).

132

133 The research M.S. is generally a 1-3 year degree. Funding varies, with some research M.S.
134 providing tuition coverage and stipend support through either teaching assistant (TA) or research
135 assistant (RA) opportunities while others require a student to self-fund their degree program. In
136 some M.S. programs, you also apply to the program rather than to a specific faculty advisor. The
137 M.S. degree consists of both coursework and research, providing you with the content and skills
138 to be successful in your career. Since the program is short and you need to start research
139 immediately, your faculty advisor will likely assign you to a research project. Your degree is
140 earned when you complete the research project, write it up as a thesis (and often as a manuscript
141 submitted to a journal with you as the first-author), and sometimes complete an oral defense of
142 your research. You complete the program with the knowledge and ability to apply these skills to

143 other settings and to be actively engaged in research programs or interpretation of research
144 findings.

145

146 The Ph.D. degree is generally a four to six year degree, though it can be longer or shorter.

147 Funding is generally guaranteed through TA and RA opportunities and internal Fellowships.

148 Coursework for Ph.D. programs varies by department; some have specific required courses or
149 required credit hours, while others are more flexible. The coursework is intended to provide the
150 foundation for mastery of a subject and the research you will conduct during your program and
151 career. The majority of your time will be spent conducting research. Typically, a Ph.D.

152 dissertation consists of at least three “chapters.” Each chapter is an individual paper that is

153 submitted for publication in a journal either during or following your degree program. The Ph.D.

154 has two major milestones: a qualifying exam or cumulative exam and a defense. The

155 qualifying/cumulative exam, which generally occurs during your second or third year, is an oral

156 and/or written exam that allows you to demonstrate mastery of your coursework and of your

157 proposed dissertation research. The defense occurs when you have completed your dissertation

158 and generally consists of your written dissertation, an oral presentation of your research, and

159 either a public or private question and answer session. Due to the longer nature of a Ph.D.

160 program, you ultimately finish your degree as one of, or *the*, world expert on your dissertation

161 topic.

162

163 The decision you initially make regarding a M.S. vs. Ph.D. program does not need to be your

164 final decision. Once you have completed your M.S. degree, if you are interested in continuing

165 your graduate studies, you can either remain at your current institution to earn a Ph.D. or apply

166 for a Ph.D. elsewhere. There are advantages to this approach, as it allows you to ensure that you
167 are interested in a Ph.D. before committing. If you decide to switch institutions or faculty
168 advisors, it provides you with the opportunity to work with multiple mentors on multiple projects
169 forming multiple connections. Alternatively, if you apply for a Ph.D., but decide that it is not the
170 right fit for you, you can often leave the program with a M.S. degree. While it can sometimes be
171 difficult to leave a program that you have committed to, making this decision represents maturity
172 and shows your commitment to doing what is best for you (Flaherty, 2019).

173

174 *Structure of a Lab*

175 Before you start preparing for graduate school, it is helpful to understand how a lab is generally
176 structured; in other words, who makes up the general lab population. The lead of the lab is the
177 faculty member, known as the Principal Investigator. The faculty member is responsible for
178 recruiting people into the lab, applying for funding to support all the people and projects in the
179 lab, setting the lab culture and expectations, and guiding the research that is occurring in the lab.
180 Some labs will have research scientists who are also leading projects within the lab, but who are
181 a source of additional mentoring and support. The bulk of the lab group will consist of graduate
182 students at various stages in their graduate career. Additionally, lab groups may have postdocs -
183 people who have already received their PhD and are “post doctorate.” In many fields, 1-5 years
184 of postdoc experience is the norm prior to receiving a permanent academic position. Postdocs
185 and senior graduate students are important mentors for beginning grad students. Lab groups may
186 also have undergraduate students working in the lab, either mentored by a specific graduate
187 student or postdoc or generally available to help with projects. Finally, labs may have lab

188 managers and/or technicians whose job are to help with the activities in the lab, including
189 ensuring the instruments are working, collecting data, and analyzing samples.

190

191 *Preparing for graduate school*

192 Expectations for graduate school applicants vary by program and university, but there are some
193 general core traits. First, applicants are typically expected to have some experience in a research
194 lab. This experience does not have to be directly related to the work you are proposing to
195 complete during your MS or Ph.D., as it is common for researchers to pivot between taxa and
196 study sites. The discipline of your previous research is also generally not important, as graduate
197 programs are focused on seeing whether you can be successful in a lab environment - conducting
198 research and carrying out the scientific process - to then extrapolate to your future success as a
199 graduate student and your exhibited interest in science. Moreover, a broad skill set with diverse
200 research tools, taxa, and research questions can highlight your ability to learn different
201 approaches. This is to say, it is never too late to change study organisms or discipline (e.g.,
202 genetics vs. behavioral ecology). Second, applicants are expected to be able to articulate
203 potential projects of interest. At this stage, your research questions can be broad, and you are not
204 expected to know your dissertation in its entirety. For example, stating that you are interested in
205 how organisms compete for resources will not help your application impress reviewers. Instead,
206 narrowing this down and expressing a question such as “How do individuals change foraging
207 strategies to avoid spatial or temporal overlap with conspecifics, and does this change along an
208 environmental gradient?” can show faculty members you are thinking deeper about ecological
209 questions. Lastly, leadership experience related to the natural sciences and community outreach
210 can be incredibly helpful, though it is not required.

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Applying to Graduate School

Finding a Faculty Advisor

Once you decide to apply to graduate school, the next step is to determine where you want to go. Some M.S. programs and a few Ph.D. programs are similar to undergraduate programs: you apply to a department and are admitted based upon the submitted documentation. However, for most graduate programs, you are applying to work directly with a faculty member on research they are conducting. Therefore, the most important step in your graduate school application process is to determine, and make connections with, a potential faculty advisor. If you have a geographic location or preferred institution in mind, you can search through the faculty on individual department websites to find people whose work interests you. But for most without these limitations, there are an endless number of institutions to examine; therefore, other methods are needed.

There are many possible avenues for finding a faculty member to work with, and it is generally best to pursue a combination of these suggestions to find someone who is both a good fit and has open funding to hire a graduate student. The first is to ask your mentors (e.g., professors you took classes with, faculty who led research experiences that you took part in) if they have any suggestions for potential faculty conducting research in areas that are related to your interests (Witz, 1994). Do not be shy about approaching them; your mentors will generally be excited that you are continuing your studies and that you have turned to them for advice.

233 The next source to find a faculty member is social media, especially Twitter. Many faculty
234 members have an active Twitter account that they use to post opportunities both in their labs and
235 in their colleagues' labs. Following faculty from a variety of institutions and identities on Twitter
236 will increase the number of opportunities that you come across. Moreover, leveraging Twitter to
237 share your research progress, projects you are working on, and community outreach you are
238 involved in can help spread who you are amongst the scientific community. In addition to
239 following faculty members, you can also follow departments, societies (e.g., Society for
240 Freshwater Science, American Geophysical Union), specialty groups (e.g., Graduate Women in
241 Science, Earth Sciences Women's Network), and graduate students to find postings about
242 graduate positions or to learn about new people who have tweets similar to your research
243 interests.

244

245 A potential third way to find a faculty advisor is through job boards (see Supplemental Material
246 2). These are often listservs that you can join with daily or weekly announcements. Some job
247 boards are devoted entirely to open positions (e.g., American Geophysical Union Job Board),
248 while others include a variety of announcements (e.g., ecology-l). You can even join these
249 listservs months to years in advance of when you want to start grad school, allowing you to begin
250 to compile lists of potential faculty advisors.

251

252 Finally, you can find faculty advisors by compiling names of people whose research you find
253 interesting. This can be drawn from journal articles that you read for classes, examples provided
254 by textbooks, or people who you have seen present at conferences. You can also read through the
255 abstracts (and then the full articles) within a journal related to your field. When you find an

256 article that you find to be exciting, look up the co-authors. Usually, the faculty member
257 responsible for the paper will be the last author on the publication, or you can also look at who
258 the faculty mentor is for the first author of the paper.

259

260 *Contacting Potential Faculty Advisors*

261 Once you identify a list of faculty with whom you'd be interested in working with, the next step
262 is to read more about them on their personal and/or department websites and to read a few of
263 their recent papers. You can use Google Scholar to find these recently published articles, which
264 may not yet be on their webpage. If you remain excited about their work, it is then time to reach
265 out to them via email (see Figure 1). Drafting this first email is important, as it represents the
266 first point of contact that they will have to you (Belasen, 2021; Gill, 2013). In this email, you
267 want to succinctly explain to them: 1) your academic background, 2) why you are excited about
268 their research, and 3) research questions that you would be interested in pursuing. You should
269 include your curricula vitae (CV) and undergraduate transcript, making it easy for them to have
270 all the information that they need to evaluate you immediately. You should also ask them
271 whether they are planning to take students to start during your desired time period and if you can

Figure 1: Email Template for Contacting Potential Advisors

Dear Dr. XXX,

My name is [insert name] and I recently graduated from [insert university], where I studied [insert major/minor]. Currently, I'm working at [insert current position, if applicable] researching [short research description]. My research experiences include [insert broad but relevant skills to the lab]. I am planning on applying for [degree] and your research lab interests me greatly.

After working on [broad topic] with [professor's name] for my honor's thesis where I examined [specific research description], I developed an interest in [general research interests for graduate school]. I am particularly interested in this field because [explanation of research interest]. Your lab's recent work in [topic related to what you mentioned] would build upon my interest in [connect their work to your research]. In graduate school, I'm interested in working with [insert tools/species/methods] to pursue broad questions such as [question 1, question 2]. I believe my interests fit into your lab and that working with you will allow me to further develop my skills while exploring my strong interest in [field].

Are you considering new graduate students for Fall XXXX? If so, I would love to discuss the possibility over email or by phone/Zoom and would be happy to provide any additional details about my background. I have attached my CV, transcripts, and honor thesis for your reference, and I hope to hear from you soon.

All the best,

XXXX

273 arrange a meeting to further discuss opportunities. To help facilitate scheduling a conversation, it
274 is best to include a list of times that work for you over the subsequent few weeks.

275

276 You should plan to reach out to several faculty members since not all faculty will have funding
277 or space in their lab to take on new students. This step of the process is exploratory – you are not
278 committed to applying to work with anyone yet. Rather, it’s a two-way street; you need to
279 interview them just as much as they need to interview you. When you work with a faculty
280 member for your graduate studies, they are committing to mentoring you and helping to develop
281 you into a professional who can succeed in the field. Your task at this stage is to set yourself up
282 with someone who has a record of serving as a positive mentor and whose style fits your needs.
283 Finally, if you do not hear back following the initial inquiry, do not hesitate to send a follow-up
284 after two weeks.

285

286 During your phone or video conversation with potential faculty advisors, you should ask them
287 questions to ensure they will be a good fit (Liang et al., 2020; Xhakaj et al., 2011; Golde et al.,
288 2001). The conversation will likely begin with you telling them about yourself and why you are
289 interested in graduate school. They will then want to know what drew you to their lab and
290 broadly, what research you are interested in pursuing. These are questions you should prepare
291 answers to in advance. Note that a lot of faculty websites are out of date, so be prepared for them
292 to share with you new research avenues that they are currently pursuing or have recently
293 received funding to pursue. You should ask them questions to learn more about these projects
294 and how a graduate student could be involved in them.

295

296 After discussing research, it is important to learn about them as a mentor (Langin, 2019). You
297 will want to prepare a list of questions in advance (see above). This list should include inquiries
298 about their mentoring style, lab culture, expectations, and time to degree completion. It should
299 also include questions about the department, including professional development opportunities,
300 collaboration, internal funding, and whether the department stipend provides a livable wage in
301 the institution's city (see Carson et al., 2021 for more considerations). It is also important to
302 discuss how you will be funded (i.e., TA, RA, fellowship) and whether funding is guaranteed and
303 for how long. Finally, you should also ask for the names and contact information of current and
304 former graduate students in the lab. You should then reach out to them and ask them similar
305 questions.

306

307 Many faculty advisors will also suggest working on a fellowship proposal, together during the
308 application process, such as the National Science Foundation's Graduate Research Fellowship
309 Program. If funded, the Graduate Research Fellowship Program would provide you with three
310 years of stipend support, allowing you more flexibility in designing your research project since
311 you will not need to TA or be tied to a research grant for your support. Note, however, that you
312 will still need funding to support any fieldwork or labwork that you do. This is also an excellent
313 opportunity to get to know a potential faculty advisor as you receive feedback on your fellowship
314 application.

315

316 Following this conversation, you can decide whether you would want to work with any of the
317 faculty members that you contacted. If you are still interested, you should send a follow-up email
318 to thank them for their time and state your intention to apply to work with them. At this time, if

319 you would like to set up another meeting for clarification purposes or other reasons, this is also
320 the time to do that. If you are no longer interested, you should still send them a follow-up email
321 to thank them for their time and state that you have decided that their lab is not a good fit for you
322 but that you hope there will be opportunities to work together in the future. Then you should look
323 into department application deadlines and requirements for the faculty with whom you are
324 interested in working.

325

326 *Application Process*

327 Graduate schools often require a personal/diversity statement, research statement, CV, three
328 letters of recommendation, and GRE scores (however, some departments are beginning to
329 remove the GRE as a requirement). The personal/diversity statement is the chance for you to
330 show why you want to apply to graduate school. Include unique experiences that you have had
331 that led to your decision and what you plan to do with your degree. In the research statement,
332 outline ideas for research projects, basing your statement on the conversation(s) you have already
333 had with your potential faculty advisor. This statement should build on ideas you have already
334 brought up in your personal/diversity statement. There are excellent online resources about how
335 to craft these statements (“OpenAcademics”, 2020) It is recommended that you start working on
336 these documents early and receive feedback from various people. Submission of the application
337 also requires an application fee; note that these can often be waived if you reach out to
338 departments directly to request it.

339

340 This will likely be the first time you have written a CV, but there are also great online resources
341 (“OpenAcademics”, 2020). It is also helpful to look at the CVs of graduate students in some of

342 the labs you are applying to if they are available on the faculty member's website. If you are
343 working with a graduate student or faculty member at your institution, they are likely more than
344 happy to share multiple CVs and help you with formatting. Note that, unlike a resume, there is
345 no page limit on a CV, and it, therefore, allows you to list all jobs, research opportunities,
346 teaching experiences, services, publications, and training that you have completed. You will
347 want to create a CV that is appropriate to your field, and you will build upon this initial CV
348 throughout your career.

349

350 You should request letters of recommendation from people who know you well and can speak to
351 your ability to succeed in graduate school and the field. If you have previously conducted
352 research, taken part in independent studies, or participated in an internship, you should request
353 letters from your mentors. Professors with whom you have taken classes can also write strong
354 letters of recommendation, but only if you have interacted with them enough for them to know
355 you well. It is important to mention here that although you may have done incredibly well in a
356 class, if the Professor does not know you well, their letter of recommendation may not be strong.
357 When you decide on the individuals who will write your letters of recommendation, reach out to
358 them early and provide them with your statements, CV, and transcript. It is also helpful to
359 provide them with a list of skills/traits you want them to highlight or specific experiences you
360 have had working with them. Numerous online resources are devoted to how to properly reach
361 out to recommenders (Lundsteen, 2018).

362

363 The final submitted application requirement is the GRE. This standardized exam must be taken
364 in advance of the application and, similarly to the SATs or ACTs, is used to compare applicants

365 from a variety of backgrounds. There are many efforts underway – generally at the department
366 level – to remove the GRE requirement (Nietzel, 2021; Sealy et al., 2019), so you should look
367 into specific requirements at the institutions to which you are applying.

368

369 The final piece of the application process is a formal interview, which generally occurs in the
370 winter. In some departments, this interview is used to assess which students to accept. In other
371 departments, students are accepted prior to the interview, and it is used as a means for students to
372 decide if they want to accept the invitation. In either case, the interview allows you to learn more
373 about the faculty member, lab, and department. It is a chance for you to continue to interview the
374 faculty member and graduate students to determine if this is a good fit for you (Oudekerk and
375 Bottoms, 2007).

376

377 **What next? Careers after graduate school**

378

379 A graduate degree can be an important step toward a fulfilling career. It provides you with the
380 toolset to succeed in the career track you choose. But higher degrees are not always “better”
381 when it comes to career opportunities – different degrees have different strengths (Wendler et al.,
382 2012). It is worth considering what type of work and structure you enjoy. Look for people who
383 have jobs you think you would enjoy and chat with them - what does their day-to-day look like?
384 What degree did they need? Keep an eye out for job ads - what sort of degrees and skills do they
385 seek?

386

387 *Careers that require a Ph.D. vs M.S.*

388 A Ph.D. is required for most academic jobs. You'll need a Ph.D. if you want to be a teaching-
389 focused professor (e.g., at a community college, undergraduate-only institution) or a research-
390 focused professor (e.g., running a lab at a university with graduate students). But a Ph.D. can
391 also be a valuable credential outside of academia: it is required (or preferred) for some
392 government science and policy jobs (e.g., USGS, NOAA), as well as some non-governmental
393 (NGO) science positions (e.g., WWF). Additionally, a Ph.D. can also be useful for science
394 journalism and science policy. Generally those positions that require a Ph.D. involve deciding
395 research directions, leading teams of researchers, and applying for research funding.

396

397 While a Ph.D. may open some additional career opportunities, M.S. degrees can be the most
398 sought after for industry, applied NGO jobs, cultural institutions (e.g., museums), and
399 government positions (e.g., wildlife biologist or data scientists for NOAA, USGS, EPA). M.S.
400 degrees can also set you up for becoming a data scientist. Generally, those positions that require
401 M.S. degrees will involve you working as a member of a larger research team or working with
402 data collected by others. These jobs also generally involve more concrete outcomes.

403

404 **Conclusion**

405 Applicants to graduate programs can be deterred from applying (or unsuccessful in their pursuit
406 (e.g., (Appleby and Appleby, 2006)) because they do not understand how to apply or how they
407 will be evaluated. Finding information about the graduate process online can be difficult and
408 time-consuming, which may deter students from applying even if they locate and meet the
409 evaluation criteria. Those who do find information online about how to appropriately apply may

410 be unable to put together a competitive application due to a lack of mentorship, understanding of
411 what a strong application looks like, and other resources critical for success in the process (e.g.,
412 example statements). In this article, we clarified how to apply to graduate school in research-
413 driven science programs to remove barriers associated with graduate school applications. In
414 addition to providing generalized but highly relevant information, we have provided links we
415 have deemed helpful for demystifying more of academia and graduate school (Supplemental
416 Material 2). These links include resources such as job boards and a document compiling links on
417 navigating the academic environment. Efforts such as this article (e.g., ((Carson et al., 2021))) are
418 crucial for individuals, especially those who are marginalized, to understand the process behind
419 entering academia and learning its hidden curriculum, which can be a major barrier to success
420 (Gardner & Holley, 2011). Providing ease of access to these resources is essential for
421 transforming academia into a more equitable space, providing an opportunity for more diverse
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439 **References**

- 440 Appleby D.C. and Appleby K.M. (2006). Kisses of death in the graduate school application
441 process. *Teaching of Psychology* , 33(1), 19–24.
- 442 Belasen A.M. (2021). How to construct a “cold email” and meet with potential grad school or
443 postdoc advisors. Online. <[https://www.anatbelasen.com/blog/how-to-construct-a-cold-email-
444 and-meet-with-potential-grad-school-or-postdoc-advisors](https://www.anatbelasen.com/blog/how-to-construct-a-cold-email-and-meet-with-potential-grad-school-or-postdoc-advisors)>
- 445 Berhe A.A., Barnes R.T., Hastings M.G., Mattheis A., Schneider B., Williams B.M., and Marín-
446 Spiotta E. (2021). Scientists from historically excluded groups face a hostile obstacle course.
447 *Nature Geoscience*, 15(1), 2–4.
- 448 Carson W.P., Kuebbing S.E., Betras T.L., Campbell A.S., McQueen E.W., Moore C.L., Olmsted
449 C.F., Roberts L.B., and Washington N.N. (2021). Advice on applying to graduate school in
450 ecology and evolutionary biology. *Bulletin of the Ecological Society of America*, 102(4), e01917.
- 451 Clark J. (2021). Masters vs PhD: Which is Right for You? Online.
452 <<https://www.thesavvyscientist.com/masters-vs-phd/>>
- 453 Flaherty C. (2019). Mastering out. *Inside Higher Ed*. Online.
454 <[https://www.insidehighered.com/news/2019/08/05/why-mastering-out-phd-program-might-
455 really-be-mastering](https://www.insidehighered.com/news/2019/08/05/why-mastering-out-phd-program-might-really-be-mastering)>
- 456 Gardner S.K. and Holley K.A. (2011). “Those invisible barriers are real”: The progression of
457 first-generation students through doctoral education. *Equity & Excellence in Education:*
458 *University of Massachusetts School of Education Journal*, 44(1), 77–92.
- 459 Gill J. (2013). So, you want to go to grad school? Nail the inquiry email. Online.

460 <[https://contemplativemammoth.com/2013/04/08/so-you-want-to-go-to-grad-school-nail-the-
462 inquiry-email/](https://contemplativemammoth.com/2013/04/08/so-you-want-to-go-to-grad-school-nail-the-
461 inquiry-email/)>
462 Golde C.M. (2001). Questions to ask when thinking about pursuing a Ph.D. Online.
463 <<http://www.phd-survey.org/advice/advice.htm>>
464 Langin K. (2019). What matters in a Ph.D. advisor? Here's what the research says. *Scienc
465 Careers*. Online. <[https://www.science.org/content/article/what-matters-phd-adviser-here-s-
466 what-research-says](https://www.science.org/content/article/what-matters-phd-adviser-here-s-
466 what-research-says)>
467 Liang P., Evans M., Horvath A., Sohn S., Li J., Ho M., Magelinski T., Foley S., Phutane M.,
468 Rachatasumrit N., Wang R., Ni W., Nam D., Ritchie J., Kothapalli A., Kannan V., Nigam R.,
469 Dasan N., Iyengar R., and Toneva M. (2020). Questions to ask a prospective Ph.D. advisor on
470 visit day, with thorough and forthright explanations. Online.
471 <[https://blog.ml.cmu.edu/2020/03/02/questions-to-ask-a-prospective-ph-d-advisor-on-visit-day-
472 with-thorough-and-forthright-explanations/](https://blog.ml.cmu.edu/2020/03/02/questions-to-ask-a-prospective-ph-d-advisor-on-visit-day-
472 with-thorough-and-forthright-explanations/)>
473 Lundsteen N. (2018). The why, when, who and what of reference letters. *Inside Higher Ed*.
474 Online. <[https://www.insidehighered.com/advice/2018/12/17/advice-securing-good-reference-
475 letters-opinion](https://www.insidehighered.com/advice/2018/12/17/advice-securing-good-reference-
475 letters-opinion)>
476 McGee E.O. and Bentley L. (2017). The troubled success of black women in STEM. *Cognition
477 and Instruction*, 35(4), 265–289.
478 Nietzel M.T. (2021). Most University of California at Berkeley graduate programs will not
479 require the GRE this year. *Forbes*. Online.
480 <[24](https://www.forbes.com/sites/michaelnietzel/2021/09/30/most-graduate-programs-at-the-</p></div><div data-bbox=)

481 [university-of-california-berkeley-will-not-require-the-gre-this-year/?sh=5454b96d122c](https://www.universityofcalifornia.edu/news/university-of-california-berkeley-will-not-require-the-gre-this-year/?sh=5454b96d122c)>

482 “OpenAcademics.” (2020). Resources. Online. <<https://www.oacommunity.org/resources>>

483 Oudekerk B.A. and Bottoms B.L. (2007). Applying to graduate school: The interview process.
484 *Association for Psychological Science*. Online.
485 <<https://www.psychologicalscience.org/observer/applying-to-graduate-school-the-interview->
486 [process](https://www.psychologicalscience.org/observer/applying-to-graduate-school-the-interview-process)>

487 Ramirez E. (2011). “No one taught me the steps”: Latinos’ experiences applying to graduate
488 school. *Journal of Latinos and Education*, 10(3), 204-222.

489 Sealy L., Saunders C., Blume J., and Chalkley R. (2019). The GRE over the entire range of
490 scores lacks predictive ability for PhD outcomes in the biomedical sciences. *PloS one*, 14(3),
491 e0201634.

492 Wendler C., Bridgeman B., Markle R., Cline F., Bell N., McAllister P., and Kent J. (2012).
493 Pathways through graduate school and into careers. Princeton NJ: Educational Testing Service.

494 Witz B.W. (1994). Some pragmatic advice to graduate students: A hybridization of Stearns,
495 Huey, and Binkley. *Bulletin of the Ecological Society of America*, 176-177.

496 Xhakaj F., Gross J., Lakhani A., Li J., Reig S., Faklaris C., Li T., Kothapalli A., Dinu J., and
497 Dasan N. The definitive ‘what do I ask for/look for’ in a PhD advisor guide. Online.
498 <<https://www.cs.columbia.edu/wp-content/uploads/2019/03/Get-Advisor.pdf>>

THE GRADUATE SCHOOL PROCESS

BY CESAR O. ESTIEN, MELISSA CHAPMAN, DR. CHRISTOPHER J. SCHELL, NICOLE LOWY, & DR. JACQUELINE R. GERSON



IN THIS ARTICLE:

- What is graduate school and I am ready?
- How do I apply to graduate school?
- What are my options after an MS or PhD?
- Resource Page

UNDERSTANDING THE GRADUATE SCHOOL PROCESS

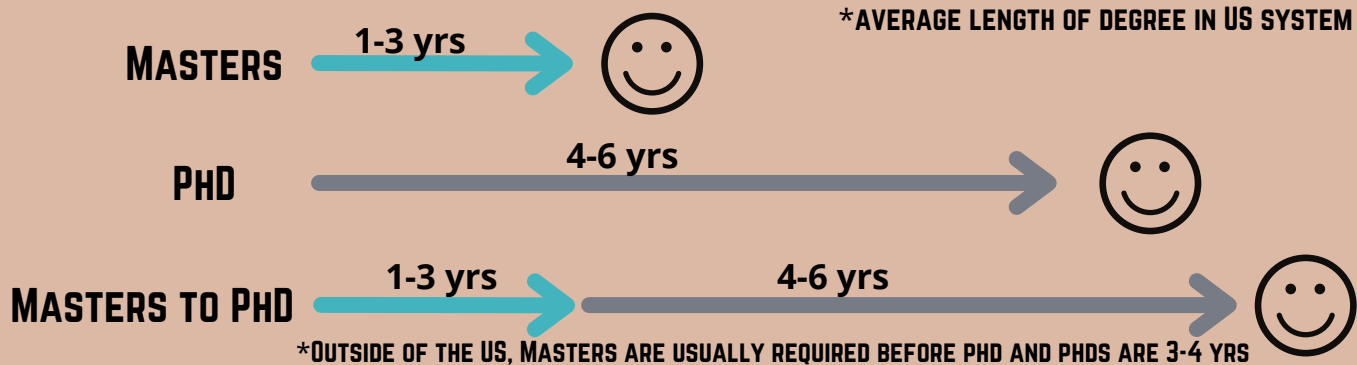
Navigating (to) graduate school can be challenging. Much of the success in this process lies behind a wall. Over this wall, one finds the “Hidden Curriculum of Academia” containing information such as how to contact faculty members for research positions. In this infographic, we will demystify one aspect of this curriculum: how to get to graduate school in biology/ecology/environmental science (broadly). Here, we will give an overview of graduate school, questions to ask if you are considering graduate school, and career paths you could consider given the degree you choose.

Note: This article is not meant to be a guiding document for developing your graduate school application. Please contact your mentor/advisor or our resources for how to build your application

WHAT IS GRADUATE SCHOOL?

1. RESEARCH THE DIFFERENCE BETWEEN A PHD AND A MASTERS PROGRAM. WHAT FITS YOUR NEEDS?

There is a lot of variation in degree programs and no one size fits all! For some careers a Master's degree is the most appropriate training. For others a PhD is necessary and/or helpful. Depending on your undergraduate training and your field, many students opt to complete a masters prior to a phd. Chat with people who have positions you could see yourself in - hear what trajectories they took!



2. WHEN IS AN UNDERGRADUATE DEGREE ENOUGH? DO I NEED A HIGHER LEVEL DEGREE FOR THE FIELD I WANT TO BE IN?

Graduate school is not a requirement for a fulfilling career!



IMPORTANT CONSIDERATION

GRADUATE SCHOOL FOCUSES MORE ON RESEARCH THAN CLASSES, PARTICULARLY IN PHD PROGRAMS. BEFORE APPLYING BE SURE TO CONSIDER:

WHAT AREAS OF RESEARCH WILL INTEREST YOU FOR 5 YEARS?

STRUCTURE OF A RESEARCH LAB:

PRINCIPLE INVESTIGATOR (PI)

POSTDOC

GRADUATE STUDENTS

LAB TECHNICIANS & LAB MANAGERS

SHOULD I APPLY?



1. WHY DO YOU WANT TO GO TO GRAD SCHOOL?

- Is the time worth it for the career goal you have in mind?
- What kind of life/work environment are you looking for? Work environment can vary by advisor and institution

2. MS VS PHD

- No single answer is the best answer & no one is the "better" choice!
- What is your career goal and which degree do you need to get there?
- Note: some programs offer the opportunity to transition from an MS into a PhD



3. DO I ENJOY CONDUCTING RESEARCH?

- A pillar to the experience of graduate school is reading and writing. From reading, you formulate questions that are meant to expand your respective field
- Reflect on if you enjoy/appreciate questioning existing processes or ways of thinking in your field



HOW DO I APPLY?

1. FIND A LAB

- The first step is to find a faculty member whose research is interesting to you via authors of papers you enjoyed reading, Twitter, and job boards
- Google these faculty members to find out more about them and visit their personal website if they have one



2. CONTACT POTENTIAL ADVISORS

- Send an email to the faculty member you are interested in working with - tell them about your research interests and background, why you are interested in their lab, and ask if they are taking new students
- Schedule a meeting to talk with them on the phone or via zoom to see if your interests and styles align



3. APPLY

- In general, the grad school application consists of a personal/diversity statement, research statement, CV/resume, and letters of recommendation
- In your statements, highlight your personal story - what unique experiences have you had that has led you to apply for grad school



4. INTERVIEW

- In the spring, graduate programs will often invite potential students for an interview
- This is when you are interviewed and learn more about the faculty member, lab, and department
- Be prepared to ask questions to graduate students about: mentoring style, funding, lab culture, and collaborations within the department and university



DIFFERENT CAREER PATHS



NONPROFIT



LECTURER



DATA ANALYST



RESEARCHER



PROFESSOR



FIELD STATION MANAGER



**SCIENCE EDUCATION
DIRECTOR**



LAB MANAGER

RESOURCES

1 **NATIONAL SCIENCE FOUNDATION**
RESEARCH EXPERIENCES FOR UNDERGRADUATES

2 **GENERAL RESOURCES:**
(1) OPEN ACADEMICS (2) BEING AN UNDERGRADUATE
(3) ACADEMIC SECRET MENU

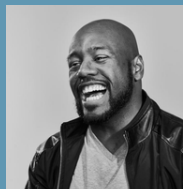
3 **JOB BOARDS:**
TEXAS A&M, CONSERVATION, ORNITHOLOGY, HERPETOLOGY

4 **HOW TO COLD EMAIL A PROFESSOR**

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Supplemental Material 2:

Links to helpful resources organized by topic.

Job Boards:

1. [Conservation Biology](#)
2. [Doris Duke Conservation Scholars Program](#)
3. [Ecolog](#)
4. [Herpetology](#)
5. [NSF REU](#)
6. [Ornithology](#)
7. [Texas A&M Wildlife](#)
8. [USA Jobs](#)
9. [Wildlife Science, Management, & Conservation](#)

Resources on the “Hidden Curriculum of Academia”

1. [Academic Secret Menu](#) (e.g., Writing a Research Thesis)
2. [OpenAcademic](#)
3. [Community Resources for Disabled Academics](#)
4. [How to Prepare an Elevator Pitch](#)
5. [How to Write a Scientific Article](#)
6. [How to Write the Results Section in an Article](#)

Websites with useful resources:

1. [Alex Lang](#) (NSF Graduate Research Fellowship Program)
2. [Mallory Ladd](#) (NSF Graduate Research Fellowship Program)
3. [Translating Academic Skills into Industry](#)

Mentorship

1. [Eebmentormatch.com](#) (Help with Graduate School & Fellowship Applications)
2. [EcologyPlus](#) (Ecological Society of America)

3. Muse Mentorship
4. SEEDS (Ecological Society of America)

Preview Weekends:

1. Cornell University
2. Princeton University
3. Michigan State University
4. Stanford University
5. University of Michigan
6. University of Southern California