

Why Graduate School





- 2 About This Series
- 2 The National GEM Consortium
- 2 Introduction
- 3 Graduate Study in Science and Engineering
- 6 The Added Value of PASSION
- 7 Top Questions Asked By Students Like You
- 11 Take the Next Step
- 13 What Do GEM Alumni Have to Say About Their Decision to Go to Graduate School



OUR MISSION

Since 1976, the National GEM Consortium has been addressing a critical shortfall in American engineering and scientific talent by increasing the participation of under-represented minorities at the Master's and Doctoral levels.

Our model is strategic and proven. We provide graduate Fellowships to highly qualified individuals from communities where such talent is largely untapped. Working in partnership with leading corporations, U.S. government laboratories and many of the nation's top universities and research institutes, we provide GEM Fellows with the much-needed financial support that is often the deciding factor in pursuing graduate education, as well as practical experience through high-level, paid summer Internships. GEM does more than provide financial support, however. We work to ensure student success in these competitive academic and professional environments with effective programs that increase the recruitment, retention and graduation of GEM Fellows. More than 3,000 GEM Fellows have gone on to successful careers.

ABOUT THIS SERIES

At the National GEM Consortium our core business is providing graduate fellowships in engineering and science to highly qualified individuals from under-represented communities. We do this to address a critical shortfall in the production of American engineering and scientific talent by recruiting from communities that are virtually untapped.

The number and percentage of U.S. citizens receiving postgraduate degrees in science, technology, engineering, and math (STEM) has been steadily declining for over two decades. Yet the need for qualified engineers and scientists has never been greater. Rewarding careers for individuals with Master's or Ph.D. degrees are plentiful. At GEM we believe that lack of information—not lack of opportunity—is the main reason more undergraduates don't pursue advanced degrees in engineering and science.

GEM designed its Getting Ready For Advanced Degrees (GRAD Lab) symposiums for students like you.

GEM's GRAD Labs help to demystify postgraduate education in science, technology, engineering, and math. They help you to understand why graduate school presents a career advantage, how to pick a graduate program, how to apply, and how to pay for it. They help you make informed decisions about this crucial phase in your life.

This publication is one of three Guides that accompany GEM's GRAD Labs. These Guides provide a helpful summary and additional resource material.

This Guide, ***Why Graduate School*** (GRAD Lab Guide One) discusses the value of advanced degrees and what will be required of you.

How to Apply to Graduate School (GRAD Lab Guide Two) explores the essentials needed to apply, gain admission to, and navigate the graduate school application process.

How to Fund Graduate School (GRAD Lab Guide Three), helps you understand financing options, locate financial aid resources, and assess assistantship options.

You can also find the schedule and locations of an in-person or virtual GRAD Lab or request that one be presented in your area by visiting www.gemfellowship.org or calling 703-562-3646.

We hope this Guide helps make graduate school a reality for you!

THE NATIONAL GEM CONSORTIUM

Since 1976 the National GEM Consortium has been developing a pool of African-American, Hispanic-American and Native American talent in the fields of science, technology, engineering, and math (STEM). We are proud of the top-rated universities, renowned research facilities, and leading multinational corporations that comprise GEM.

Each year we identify and recruit more than 1,000 undergraduate students, graduate students, and working professionals for admission to advanced degree programs. Through three graduate Fellowship tracks—Master of Science in Engineering, Ph.D. in Science, and Ph.D. in Engineering—we provide financial support and practical experience through paid summer internships. We also work to ensure success for our Fellows in these highly competitive academic and professional environments by providing programs through Member Universities.

The GEM Alumni Association, an influential network of more than 3,000 GEM Fellows, works to promote STEM education among America's under-represented populations and bring exciting career opportunities in science and engineering to all.

INTRODUCTION

America has outsourced much of its manufacturing overseas and one of the last competitive advantages the U.S. still holds is its technological innovation. To maintain that competitiveness our nation needs technical talent more than ever. Unfortunately, data from standardized tests seems to indicate a decline in the number of students interested in studying science, technology, engineering, and applied mathematics (STEM).

That's why we're thrilled that you're interested in learning more about graduate school and the STEM disciplines. In *The World is Flat*, author Thomas Friedman describes the world becoming

increasingly interconnected. Technologies, economies, and cultures are all competing and converging. And they're doing so quickly. He cites, "to remain competitive, we need to remain on the cutting edge educationally."

Here are a few interesting facts. Last year, the U.S. produced approximately 65,000 new STEM professionals. South Korea produced the same number but with only one-sixth the population. In the same time period, China and India produced nearly one million STEM professionals.

Organizations like the National Science Foundation and the National Institutes of Health have stated that one way to significantly increase the shortfall is to recruit from under-represented minority communities. We couldn't agree more!

This is why GEM and other organizations are providing funding to talented individuals like you to pursue advanced degrees in the STEM fields. (To see what funding is available see GRAD Lab Guide Three: **How to Fund Graduate School.**) But first, let's see if graduate school in a STEM discipline is right for you.

GRADUATE STUDY IN SCIENCE AND ENGINEERING

Why Graduate School?

This is the fundamental question. There are many reasons for attending graduate school in a STEM discipline. The main one should be because you have a sincere interest and aptitude in the field and you desire more in-depth knowledge. Other reasons you might go to graduate school include the desire for personal growth, skill development, career flexibility, and increased compensation.

Personal Growth

Personal growth refers to the things you experience that help you better know yourself and gain increased confidence in your abilities. The things you experience—big and small fuel personal growth.

You might attend graduate school in a place very different from your hometown or undergraduate community. Those differences may be geographical, cultural, political, or academic—all which can spark personal growth. If you remain at your undergraduate institution for graduate studies the changes may be more subtle, however personal growth is possible regardless of your surroundings.

Some of you may find yourselves in a different area of the country. Imagine experiencing snow and cold for the first time if you're from California, or missing the seasons change if you've moved from the Northeast to the West Coast. Or maybe you're moving to an area that's culturally different from what you're used to. A change from the campus of the University of Iowa to the cityscapes of New York City's Columbia University can present you with a wonderful opportunity for personal exploration and growth.

You also can't underestimate the differences that exist between colleges and universities. Some schools are considered to be politically conservative, while others are known to be liberal, and still others are known to be progressive. In fact the academic standards and approaches to STEM education may vary from school to school. Some may be more applied and less theoretical than others. This does not imply that one approach is better than another. It simply means that there is more than one approach to operating a STEM institution.

Most important—universities are dynamic entities comprised of distinct components and people. When you combine a school's administration, faculty, students, and employees, you have an institution with its own political identity, an identity that can change as administrations and employees change, students graduate, and professors come and go.

The people you meet, the location and culture of a school can all be catalysts for your personal growth.

Skill Development

If you're exploring graduate studies you probably have an avid interest in and a keen desire to learn more about your field of study. Graduate school provides an excellent opportunity to grow your knowledge base—and not just within your specific discipline. You'll be exposed to scholars and visitors from all around the

“There were two reasons that I decided to go to graduate school. First, I believed a degree would give me a competitive advantage that would result in more opportunities in the marketplace. I also thought a graduate degree would give me the additional flexibility of pursuing a Ph.D. so I could choose to teach or become a consultant, should the Fortune 500 corporate world not work out for me.”

Reggie Abel
Regional Director of Marketing / Business Strategy
Boeing Commercial Airplanes





world performing cutting-edge research. You'll learn about new computer aided design tools, specialized diagnostic procedures or techniques, as well as particular mathematical or computer skills that might aid your research. You may even learn specialized skills like how to operate a particular diagnostic instrument like an electron microscope, or a particular gene sequencing technique.

In addition your basic skill sets will be fine-tuned. Your writing skills will be enhanced by the many abstracts, papers, proposals, and the thesis you may write. Your verbal skills will be sharpened by the lectures and technical presentations you'll give. Mathematical modeling, computer simulations, and the analysis of the data will increase your math and analytical skills.

Graduate school can also elevate your level of professionalism. By becoming a member of a professional organization of engineers or scientists you increase your ability to network with students like you. Most professional organizations offer a discounted (or free) student membership. Professional engineering and scientific organizations generally hold national or regional conferences annually, which might present opportunities for you to present research findings to your peers and fellow researchers.

Career Flexibility

Attending graduate school can also provide you with enhanced career flexibility. With a graduate degree—especially a Ph.D.—you'll have a greater opportunity to achieve meaningful employment. In fact, some positions, such as that of lab director or faculty member require (at least) a Ph.D. in a STEM discipline. A Master's degree also will give you a competitive advantage in the job market. With a Master's degree in electrical engineering you are more apt to get an interview as a circuit designer well before your counterpart with a Bachelor of Science degree in the same discipline.

Increased Compensation

And let's be practical. One of the main reasons you might consider getting a graduate degree is the anticipation of a higher salary. It is not unreasonable to think that you'll receive a higher starting salary if you attain your Master's than those students who do not. Similarly Ph.D.s tend to begin their working careers at higher salaries than those with a Master's level degree. And even though obtaining a Ph.D. may place you in the job market five to six years

later than a person who only holds a Bachelor of Science degree, with a Ph.D. your net income over your lifetime will be significantly higher.

Comparison to Undergraduate Study

It would be unfair to say that graduate school will be more difficult than a bachelor's program. A more realistic characterization is that you may find graduate school to be more intense. As with undergraduate courses, courses taken in graduate school are based on a syllabus and a list of recommended textbooks as well as papers or notes that a professor may hand out. However, in graduate school, much of the course material may not be discussed in a lecture or show up in the assigned reading, but may be given as homework assignments. Professors generally assume that as a graduate student you are a scholar who will take much greater responsibility for your studies.

Graduate school is also more intense because you'll be faced with technical problems that have no readily available solution. Typically, undergraduate course assignments all have solutions. In graduate school you're more likely to be expected to either refute or support a currently accepted model or design philosophy. Graduate studies are intended to help you further your knowledge by performing research into the unknown or unexplored.

As a Ph.D. candidate you'll begin to focus even more finely on an area of specialty. For example, in the study of electrical engineering you might focus on optical electronics. Then within this subspecialty you'd choose a particular emphasis. For example, if you're studying optical engineering, you might choose to study from within the general class of lasers those that emit light in the blue-green region of the visible light spectrum. Within this narrow field of study, in which you'll become an expert, your Ph.D. problem may concentrate on some particular aspect of lasers in the blue-green region of the visible spectrum, for example the design and growth of a laser operating in this regime of the visible spectrum.

Overall while more intense, graduate programs are less structured and more flexible than undergraduate programs. Course selections are predicated more on the direction of your studies. Much of your time will be spent conducting research, reading coursework literature, writing papers contributing to literature, attending or

giving seminars and talks and presenting your work to peers in a variety of environments. The major difference you'll find in graduate school is that you'll need to show much more initiative and take responsibility for scheduling your own time to reach your goal of completing your graduate degree.

THE ADDED VALUE OF PASSION

Let's say that you finish school at age 25. And that you expect to work until you're about 65. That means you may be performing the same job or be at the same company for the next 40 years. That might seem overwhelming but the ingredient you need to add to your tool kit to ensure 40 years of success is PASSION. Anything that you choose to do for 40 years should be something that is interesting, fulfilling, and challenging—something you're passionate about. And while every day may not be perfect, doing something that you would do even if you were not getting paid, truly helps.

What is PASSION?

Persistence

Attitude

Self-Determination

Strategy

Influence

Opportunity

Network

Persistence

Think back to your greatest accomplishment to date. Was it something that was completed quickly and with little effort? Or did it take time and diligence by you and/or your team to achieve the desired outcome. Graduate programs are like the latter. To be successful your program may take hours of preparation and training, skill development, and strategy. When a project isn't going well, your advisor has only negative feedback to offer, your research team finds holes in your monthly presentation, and everything seems to be going wrong it will be persistence that will pull you through. Remember that starting a project is easy. Finishing that project may take persistence. But there's nothing like a job well done.

Attitude

It's often said that your aptitude is determined by your attitude. Everyone likes to work with individuals who have a positive attitude. A great part of successfully completing your graduate program will be approaching each day with the attitude of: "I'm going to work as hard as I can and finish this because not completing my graduate program is not an option." Write it on a postcard and put it on your refrigerator or bathroom mirror. You should recite this to yourself every day until you've graduated.

Always remember being accepted into a graduate program means you're qualified to be there! From that moment on, the only thing that can prevent you from completing the program is YOU!

Self-Determination

Self-determination is controlling your own destiny. It's a combination of attitudes and abilities that enable you to set goals and to take the initiative to reach them. It means making your own choices, learning to effectively solve problems, and taking responsibility for your choices and for your life.

Strategy

Strategy is the bridge between your goals and your actions. It refers to a complex web of thoughts, ideas, insights, experiences, goals, expertise, memories, perceptions, and expectations that provide general guidance for specific actions in pursuit of particular ends. Simply put, to succeed you must have a plan.

When considering graduate school, before you enroll in one course you should know the next courses you'll take. It's never too early to think about who will be your future graduate advisor... which people you'll approach to be on your graduate committee... which research topics you'll submit to your committee for review... what resources you'll need to be successful. Success does not just happen. To be successful you need to constantly think and re-think what strategies will move you closer to finishing your graduate program.

Influence

Once you obtain a graduate degree you should—and will—command more influence than you would without a degree. Those who possess a graduate education are the engines that drive universities and corporations. With a graduate degree you

can change the way we live with an invention or innovative public policy. You can author publications and literature for education or pure enjoyment. With a graduate degree you'll become adept at influencing an audience to see ideas from several perspectives. Influence can cause humans to change and when used correctly can move people in positive directions. There's no telling what change you'll be able to bring to the world.

Opportunity

Opportunity is defined as a favorable or advantageous circumstance or combination of circumstances. Never has there been a more opportune time for under-represented students to earn a STEM degree. Our country is looking for STEM professionals; what better time to pursue a STEM graduate degree. Plus, keep in mind that there are vast opportunities now for students to attend graduate school for free, especially under-represented minorities and women. (See GRAD Lab Guide Three: *How to Fund Graduate School.*)

Network

Networking—engaging others in conversation to develop contacts and exchange information—is a career-development necessity. Your opportunities are as big as your network. Thus, knowing how to initiate a conversation with “well placed” people in the profession is key. It does take practice, but it's a skill worth developing. We sometimes say, “Those who don't network, won't work.”

Plus, if you go to graduate school as a GEM Fellow you will automatically join a network of existing GEM Fellows and GEM Alumni that are successfully working on graduate degrees or working in STEM professions. Each and every one of them is interested in your successful entry into a STEM graduate program. But more importantly, when graduating with a support system like that success is almost assured.

TOP QUESTIONS ASKED BY STUDENTS LIKE YOU

At GEM's GRAD Labs we often have students attend who have not made the decision to go to graduate school. At Grad Labs we encourage participants to be open and honest—to ask the hard questions. We thought you might be interested in a few

“I decided to go to graduate school because I felt that there was more engineering expertise to gain, and I wanted to be confident in my ability to attack problems that would be presented along the way. I also knew that I would eventually like to pursue a career in academia and that a graduate degree is almost a prerequisite for success.”

Gregory M. Wilkins, Ph.D.
Lecturer/Research Professor, Department
of Electrical and Computer Engineering
Morgan State University



CHEMIST

of the questions and concerns that have been raised over the years. Knowing that your concerns may not be new, and knowing the answers we've provided, may help you make an even more informed decision.

“I will only go to graduate school if I don't get a job offer.”

At GEM we understand that there is a very practical need to earn income. To take advantage of all of your options we suggest that you pursue your job search and research graduate schools and graduate school funding simultaneously. While getting a job right out of college is an attractive alternative, it's been proven that people who pursue advanced degrees have the potential to earn much more over their lifetime. There is a lot of money available, especially for under-represented minorities, to go to graduate school in a STEM field for free and receive a living stipend. That gives you money to live on today, while positioning you to make more in the future. Read the third Guide in this series, **How to Fund Graduate School** before making the decision not to apply to graduate school.

“I am thinking about going to graduate school at night and finding an employer who will pay for it”.

Employer education reimbursement programs are certainly a viable option to pay for graduate school. But it's difficult to perform well at both work and graduate school and achieve any type of work life balance. Plus keep in mind employers want you to pursue degrees that will help their bottom line. That's great if your passion aligns with that of your company, but if it doesn't you may find yourself studying something that you only marginally care about. Going to graduate school full time ensures that you are fully engaged and have the opportunity to get the most out of the graduate school experience, including the ability to network with others involved in advancing their education, and to design a graduate program that's just right for you. And, if you can achieve this for free, plus receive a living stipend, why struggle going part time at night?

“I cannot possibly afford to go to graduate school. I have loans and I need to contribute to my family at home.”

No one knows your personal financial circumstances more than you. We also understand your desire to contribute to your family and help out as soon as possible—many of us have been in the same situation. Even so, we advise students like you to not let

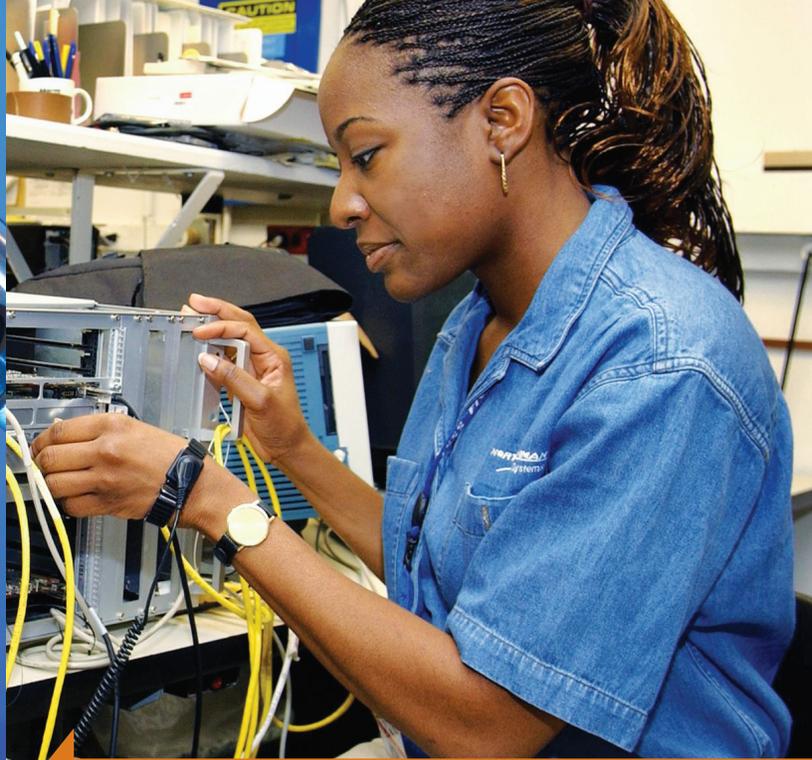
money be your primary factor for not going to graduate school. We encourage you to read the third Guide in this series **How to Fund Graduate School**...to learn about the viable options available to take the issue of money off the table. Then we want you to consider this, people with graduate degrees make higher salaries and have more career options than people who do not. Going to graduate school now—especially if someone else funds it—will just position you better to earn more for your family in the future.

“I think I will apply to graduate school after working for a couple of years.”

Going back to school after you've worked a couple of years can be tough for two reasons. First, success in many engineering and science graduate programs require you stay abreast of the latest technical skills, knowledge and trends. At work your focus will be a little different. You'll be focused on arriving to work on time, project deadlines, meetings, politics and the overall corporate culture. You won't necessarily use your differential equations or thermodynamics skills on a daily basis. To ensure you can reenter academia successfully make sure you continue to hone your technical skills. Enrolling in a technical course at a local community college or taking a professional course offered by a technical organization are ways to do that. The second barrier to going back to school after working is purely financial. Dr. Marcus Huggans, GEM Alumnus and current GEM staff member is known for saying “the only thing worse than being poor is going back to being poor”. If you know you plan to return to school it's important that you maintain a student's lifestyle to make that transition easier. Incurring debt, like buying a new car or running up credit cards, or paying high rents makes it that much more difficult to revert to student life. Our advice, go to graduate school directly, leverage the financial opportunities available to you, and gain the possible industry experience you may be looking for through programs like GEM.

“My undergraduate program is hard enough, how could I possibly survive in graduate school?”

The best kept secret about graduate school is that it is “easier” than undergraduate studies in many ways. Yes, graduate programs require strong performance (a C is failing), and require you to think differently, but the program design already assumes you are smart and have a



baseline of knowledge. Plus in graduate school you're focused solely on an area that you are passionate about. You're delving further into areas you're already hungry to explore and find out more about. Doing something you love to do makes surviving graduate school that much easier. While certainly not always the case, we know that often the first hurdle is believing you can be as successful as your majority counterparts. We've got over 3,000 alumni that say you can be successful in graduate school and go on to excel in a fulfilling STEM career. We know you can do it!

“When will I find a spouse if I stay in school”?

This is one of our favorite questions. Finding a lifelong partner is a daunting task whether in school or not. Finding a spouse in the workforce is no picnic either. Finding that right person often is about living your life fully. Get out and find things that you're interested in, places you like to explore, hobbies you like to indulge in—chances are you may find your perfect mate is interested in the same things. True love will not find you, whether you're stuck in an office cubicle or in the campus library. The only way to increase your chances at finding your life mate is to get out and enjoy life. Strike the right balance; advance your professional career while maintaining a healthy and happy life.

“Graduate school sounds like it will take a long time!”

On average a Master's program in the United States takes only four semesters. Two years to significantly advance your career is not that long. And in return for those two years you'll be much better positioned for success. Your two year investment helps broaden the option of careers that are open to you while ensuring a higher income than those students who just graduate with a bachelor's degree. And, if you complete your Ph.D. your career choices and income potential are even greater. Ph.D.s take on average five years (inclusive of the two years for the Master's), however the length of the programs varies widely across programs, across faculty advisors and universities. Obtaining a Ph.D. is not about time it's about passion.

“I heard that you are overqualified with a Ph.D.”

The jobs you apply for with a Ph.D. are very different than the jobs you would apply for with just a bachelor's. Just like you wouldn't apply for a job as a cashier at a fast food chain once you have a bachelor's degree in engineering or science, there are some jobs you won't apply for with a Ph.D. But let's say you were competing

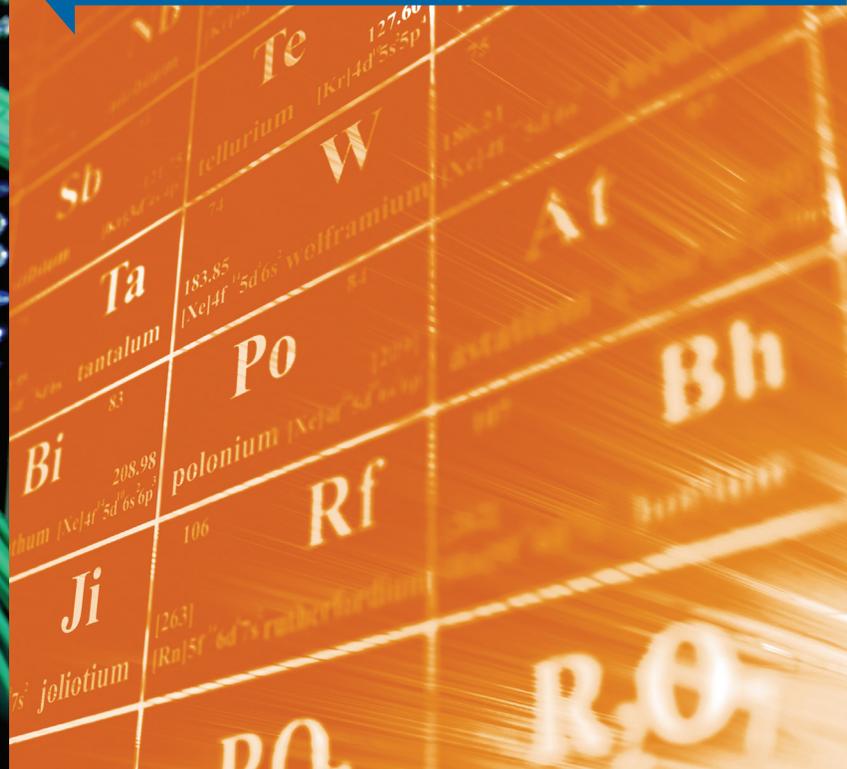
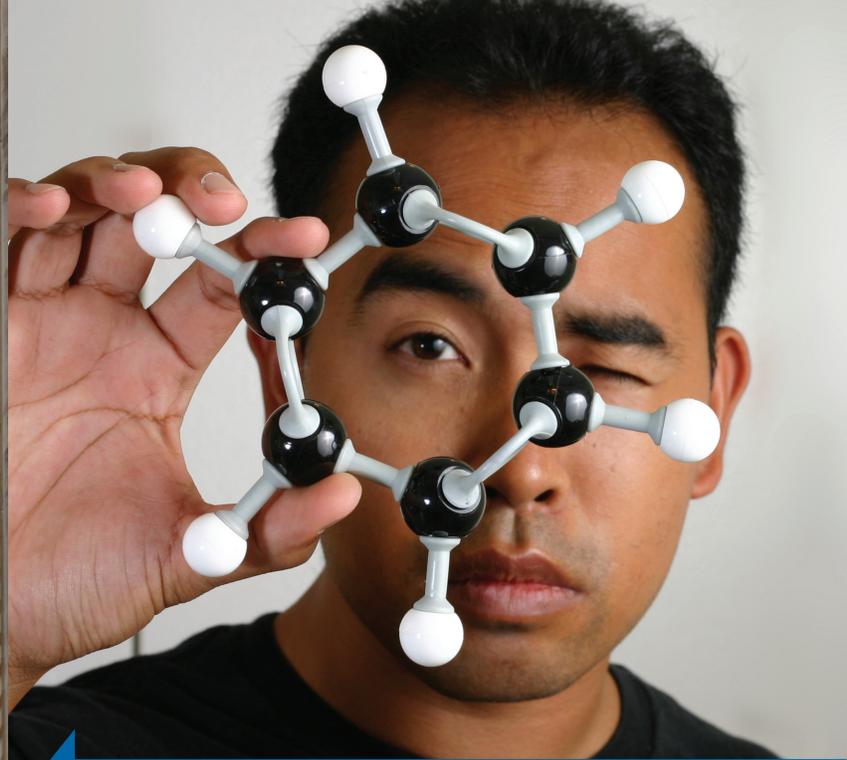
in a tough job market, having greater skills allows you greater flexibility to package yourself for a broader variety of jobs. Once you reach the rank of Ph.D. the idea of having one resume to fit all positions goes away. You can always not list your Ph.D. during a hard-pressed job search, but conversely you cannot add a Master's or a Ph.D. to your resume to apply for a job that requires this level of credential.

“I am tired of engineering/science, I am thinking about getting my MBA or Law Degree.”

GEM's mission is to increase under-represented participation at the graduate level in engineering or science. We do understand however that pursuing your true interest is paramount in obtaining a successful career. Explore if there are programs that will allow you to pursue a Master's in your technical field along with a professional degree. Having a technical proficiency may make you even more marketable. However, we urge you to remember any undergraduate can obtain an MBA or Law Degree. You have to have an undergraduate degree in engineering or science to get on the pathway to an advanced degree and successful career in the STEM fields.

TAKE THE NEXT STEP

All of our Alumni can't be wrong. There's something very powerful and empowering about pursuing your graduate degree. It's a decision that can impact your success for years to come. Don't stop now....find out what you need to know about applying for graduate school by reading **How to Apply to Graduate School** (GRAD Lab Guide Two). While we certainly hope you'll join the ranks of STEM graduate students the staff of the GEM Consortium wish you the best of luck with whatever path you decide to take.



WHAT DO GEM ALUMNI HAVE TO SAY ABOUT THEIR DECISION TO GO TO GRADUATE SCHOOL

We've tried very hard to give you a realistic view of graduate school. We've given you many reasons why you might want to consider graduate school in the STEM field but nothing we say can take the place of the sentiment of our Alumni. Read what former GEM Fellows have to say about why they decided to go to graduate school.

“Getting a Master’s Degree opens up many high-end job opportunities in Computer Science. Instead of starting at the bottom of the ladder, you fast track to more senior-level positions. Companies recognize the additional knowledge and experience you possess and reward you with higher pay, better job titles, and more challenging work.”

Elyse L. Luncor
Senior Member of Technical Staff—
Computer Software Research & Development,
Sandia National Laboratories



“Most students leaving undergraduate programs are generalist engineers whose careers are impacted largely by their first job opportunity. Graduate school was the means for me to garner a specialization in a world that increasingly values specialization. Understanding that a variety of financial assistance options at the graduate level were available made the cost/benefit decision that much more palatable.”

Derrick Reagins
Senior Investment Professional
Victory Partners, LLC



“The main reason I decided to go to grad school was to learn more about the Electrical Engineering Field. Unlike many of my friends, I attended grad school immediately after completing my undergrad. Now that I am working full time, I realize that it was the best decision of my life; because once you enter the work force, and/or start a family; it’s much harder to go to school.”

Enos Fabre
Multimedia Ongoing Product
Development Engineer
Ford Motor Company



“In this day and age ambitious individuals need every advantage they can get to help them succeed and distinguish themselves in today’s society and work place. One of those advantages is an advanced degree, which provides not only further academic understanding and training, but sends a clear message to others that you are not afraid to go above and beyond the standard. It is for that reason I considered graduate school one of the best investments I could make for my long-term career. It has helped not only jump start my career but it also helped distinguish me from my peers.”

Christopher Michael Lehmann
Advanced Systems Engineer
3M



“I decided to go to graduate school because I realized early during my undergraduate studies that I had the vocation to be a teacher.”

Dr. Sonia M. Bartolomei-Suarez
Professor, Department of Industrial Engineering
University of Puerto Rico Mayagüez



“Graduate school was an opportunity to personalize my education. I was looking forward to interacting with faculty, performing research, and being a teaching assistant—all remarkably different experiences than what I obtained as an undergraduate. I joined the work force not only more prepared, but eager and ready to face new challenges.”

J.J. Velasquez
Rocket Propulsion Engineer
Pratt & Whitney Rocketdyne



LINKING EXCEPTIONAL TALENT TO EXTRAORDINARY CAREERS

