

Careers Toolbox

for Undergraduate Physics Students & their Mentors

Fourth Edition



American Institute of Physics Career Pathways Project

AIP Statistical Research Center

Society of Physics Students

www.spsnational.org/career-resources

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NSF Award Number: 1011829



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One Physics Ellipse

College Park, MD 20740



Table of Contents

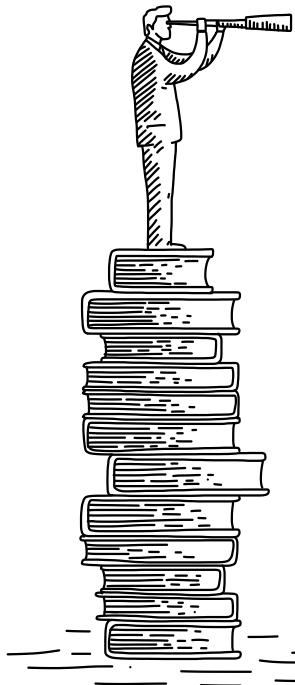
American Institute of Physics Career Pathways Project: Background	3
Acknowledgments	3
Motivation	4
How You Can Use the Careers Toolbox	5
What You Can Get Out of the Careers Toolbox	5
Section 1: Exploring Options, Finding Opportunities	7
Tool #1: Common Job Titles	11
Considering Teaching	12
Exercise - Tool #1: Identifying Job Titles of Interest	13
Tool #2: Informational Interviews	15
Exercise - Tool #2: Planning For Your Informational Interviews	18
Tool #3: Gaining Experience	20
Exercise - Tool #3: Gaining Experience	21
Tool #4: Networking	22
Exercise - Tool #4: Networking Skills – Constructing Your Elevator Speech	25
Section 2: Assessing Your Knowledge and Skills	27
Tool #5: Identifying Your Skill Sets	29
Exercise - Tool #5 – Part 1: Brainstorming Your Experiences	33
Exercise - Tool #5 – Part 2: Identifying Skill Sets from Your Experiences	34
Identifying My Skills – An Assessment Worksheet	36
My Skills Summary	37

Section 3: Getting to Work	38
Tool #6: The Job Search Strategy	39
Mental Maintenance... When Looking for a Job	40
Exercise - Tool #6: Developing a Job Search Strategy	49
Tool #7: Putting You on Paper—The Resume	50
ACTION Verb List for Developing Resume Bullet Points	55
Exercise - Tool #7: Building the “Knowledge and Skills” Section of Your Resume	56
Sample Resumes	58
Tool #8: Writing an Effective Cover Letter	61
Exercise - Tool #8: Building the “Middle” Paragraph(s) of Your Cover Letter	62
Tool #9: Acing the Interview	64
Sample Interview Questions	70
Exercise - Tool #9: Preparing for an Interview	71
Section 4: Career Preparation and Your Department	72
Affecting Change in Your Department/Program	73
Communicating with Campus Career Professionals	74
Resources for Physics Students	75

American Institute of Physics Career Pathways Project: Background

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Careers Toolbox 4th Edition Authors

Brad Conrad – Director – SPS and $\Sigma\pi\Sigma$, AIP Education Division
Kerry Kidwell-Slak – Assistant Director – SPS and $\Sigma\pi\Sigma$, AIP Education Division
Toni Sauncy, Associate Professor of Physics – Texas Lutheran Univ. & former Director – SPS and $\Sigma\pi\Sigma$
Katherine Zaunbrecher – Post Doctoral Researcher – Colorado State University
Patrick Mulvey – Senior Survey Scientist – AIP Statistical Research Center

AIP Career Pathways Project Investigators

Roman Czujko, former Director – AIP Statistical Research Center
Thomas Olsen, former Assistant Director – SPS and $\Sigma\pi\Sigma$, AIP Education Division
Kendra Redmond, former Programs Manager – SPS and $\Sigma\pi\Sigma$, AIP Education Division
Toni Sauncy, Associate Professor of Physics – Texas Lutheran Univ. & former Director – SPS and $\Sigma\pi\Sigma$

Careers Toolbox Reviewers

The following reviewers provided valuable insight into the content of this toolbox:

Bridger Anderson, Program Manager – Innovative Micro Technology
Crystal Bailey, Career Program Manager – American Physical Society
Pat Boeshaar, Senior Lecturer, Physics Department – University of California, Davis
Staci Heidtke, Associate Director, Career Services – University of Wisconsin-Eau Claire
Robert Hilborn, Associate Executive Officer, American Association of Physics Teachers

Careers Toolbox Student Contributors

Amanda Palchak – University of Southern Mississippi, SPS Summer Intern 2011
Shouvik Bhattacharya – Minnesota State University, SPS Summer Intern 2012
Jose “Ro” Avila – King College, SPS Summer Intern 2013

Careers Toolbox 4th Edition Layout Design

Hyun Joo Kim – Graphic Designer – SPS and $\Sigma\pi\Sigma$, AIP Education Division

About the Society of Physics Students and the American Institute of Physics

The Society of Physics Students (SPS) is a professional association explicitly designed for students and their advisors. Membership, through collegiate chapters, is open to anyone interested in physics. The only requirement for membership is that you be interested in physics. Besides physics majors, our members include majors in chemistry, computer science, engineering, geology, mathematics, medicine, and other fields. Within SPS is housed Sigma Pi Sigma, the national physics honor society, which elects members based on outstanding academic achievement. This unique two-in-one society operates within the American Institute of Physics.

The American Institute of Physics is a federation of scientific societies in the physical sciences, representing scientists, engineers, educators, and students. AIP offers authoritative information, services, and expertise in physics education and student programs, science communication, government relations, career services, statistical research in physics employment and education, industrial outreach, and history of the physical sciences. AIP publishes *Physics Today*, the most closely followed magazine of the physical sciences community, and is also home to the Society of Physics Students and the Niels Bohr Library and Archives. AIP owns AIP Publishing LLC, a scholarly publisher in the physical and related sciences. www.aip.org

AIP Member Societies: Acoustical Society of America, American Association of Physicists in Medicine, American Association of Physics Teachers, American Astronomical Society, American Crystallographic Association, American Meteorological Society, American Physical Society, AVS-The Science & Technology Society, OSA-The Optical Society, & The Society of Rheology.

Motivation

Nearly half of all physics majors enter the workforce after graduation.

In many undergraduate physics departments, the primary focus is on preparing students for graduate study. While these efforts are important, only about one in three bachelor's degree recipients in physics will go on to graduate school in physics. Others will go to graduate school in another field. A third group will enter the workforce. The Careers Toolbox is an inclusive guide focused on providing resources and guidance for these individuals who are seeking employment. By using the tools within this guide, students will be able to overcome obstacles such as the lack of information about the wide variety of workforce opportunities, graduate school, financial remuneration, and professional skills that all physics bachelor's degree recipients obtain.

Students completing the undergraduate degree in physics are unique.

This is a central motivation for the AIP Career Pathways Project. The physics degree program, whether in a large research institution, a small liberal arts college or any institution in between, is often one of the most revered (and feared) majors. Most physics students who successfully graduate gain a unique set of skills and knowledge relative to other degree programs. The kinds of problem-solving abilities gained by undergraduate physics students are desirable in a wide range of work settings. However, translating these abilities from an undergraduate program to a great job can be challenging.

Physics students face obstacles when entering the workforce.

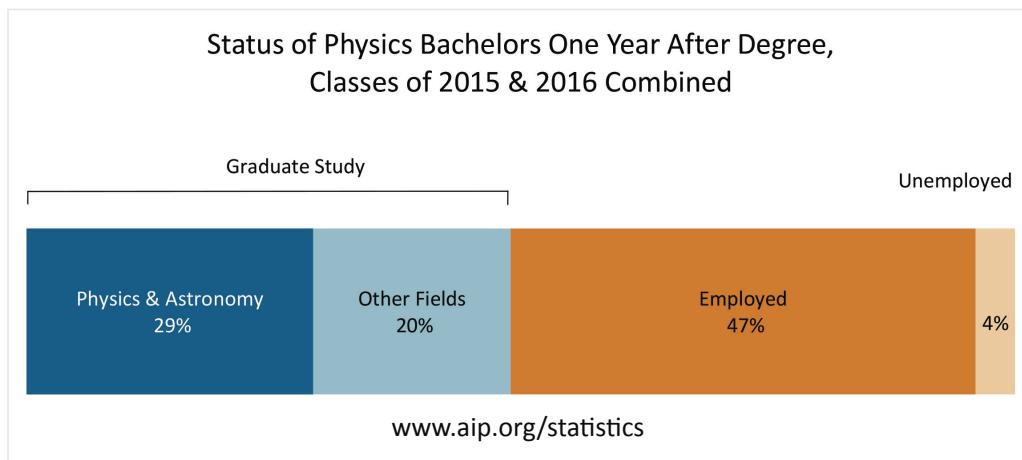
Despite their unique preparation for tackling a wide range of problems, physics students may face challenges when navigating the job market.

- Hiring professionals may not understand what a physics student actually knows or is capable of doing.
- Physics faculty may not understand what a physics student actually knows or is capable of doing outside of academia.
- Individual students may not understand the value of what they know or are capable of doing!
- Campus career professionals may not know about the kinds of positions typically available to individuals with a physics background.

Data Driven Approach: The latest data on physics and astronomy majors in the US indicates that while graduate school is a common destination for Physics Bachelors, employment or seeking employment is just as common.

The Careers Toolbox is designed to provide tools to overcome these obstacles and assist students in becoming more effective job seekers.

The Careers Toolbox for Undergraduate Physics Students is unique because it has been tailored especially for **you**, physics students. The Toolbox will be as useful as you make it. Contributing dedicated time and effort to preparing for and planning your career will pay dividends.



One year after receiving their degree, most physics bachelor's degree recipients are employed or seeking employment.

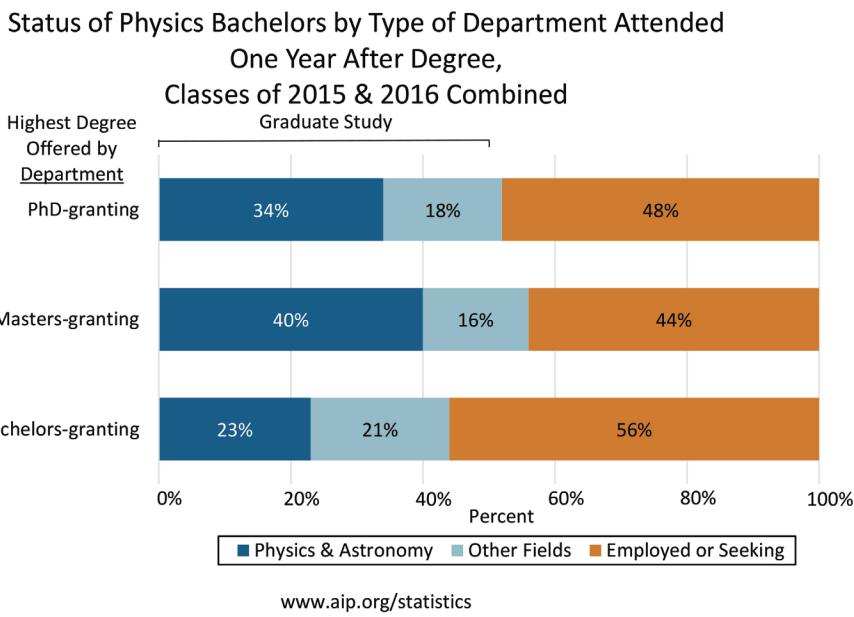


Figure 1

Of the combined 2015 and 2016 graduating classes of physics bachelor's degree recipients as sorted by type of department attended, approximately half were enrolled in graduate programs by the winter following their degrees, and the remaining half of students had entered the workforce.

How You Can Use the Careers Toolbox

Start early. Repeat.

Many of the tips and techniques presented here are designed to be used as early as the first year of your undergraduate experience but can be more timely if you are in your junior or senior year. It's never too late to start!

This book is iterative and intended to be written in. Revisit the skills and knowledge assessment, update your personal pitch, or elevator speech, often, and continue to build your network throughout your undergraduate career. It is recommended that you update your skills and knowledge assessment each semester.

Ask for guidance.

While these tools are written so that you can work through them independently, you should seek out the assistance of mentors, career professionals, and others in your network. You are not alone!

What You Can Get Out of the Careers Toolbox

Career option awareness: There are a wide variety of options for students who successfully complete their undergraduate degree in physics or astronomy.

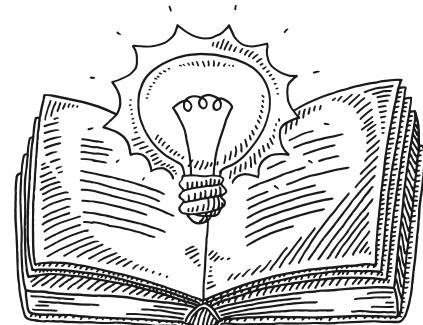
Employment search tips: Physics and astronomy majors can learn where and how to seek opportunities for employment.

Establish career objectives: Learn how to find and make effective use of existing career-related resources to achieve your career objectives.

Overcome obstacles: Understand some of the obstacles that can hinder your progress toward your desired career goals and how to overcome those obstacles.

Be the change: Affect the change you want to see within your own department by engaging faculty mentors, making connections with career professionals, and making use of resources produced by the AIP Careers Toolbox.

Mental health: Being a physics major is not easy. Learn some techniques for making sure you are taking care of yourself.



Other Resources

- **Career Options – the SPS Observer Special Issue**

www.spsnational.org/the-sps-observer/issues/summer-2014

- **Informational interviews:**

www.spsnational.org/the-sps-observer/summer/2017/leveraging-untapped-power-informational-interviews

- **Building community within a department:**

www.spsnational.org/the-sps-observer/summer/2017/building-community-crossing-boundaries

- **Phys21 report synopsis:**

www.spsnational.org/the-sps-observer/summer/2017/get-prepared-21st-century-career

- **How to make an awesome poster:**

www.spsnational.org/the-sps-observer/spring/2017/seven-suggestions-how-make-awesome-poster

- **Making the most of a research experience:**

www.spsnational.org/the-sps-observer/spring/2017/navigating-your-research-experience-and-making-most-rough-waters

- **What to expect at your summer research experience:**

www.spsnational.org/the-sps-observer/spring/2017/what-expect-your-summer-research-experience

- **Promoting diversity and inclusion within a department:**

www.spsnational.org/the-sps-observer/winter/2017/seeking-unification-advice-promoting-diversity-department

- **Understanding diversity and inclusion within physics:**

www.spsnational.org/the-sps-observer/winter/2017/understanding-and-promoting-diversity-and-inclusion-physics

- **Navigating Failure – the SPS Observer Special Issue**

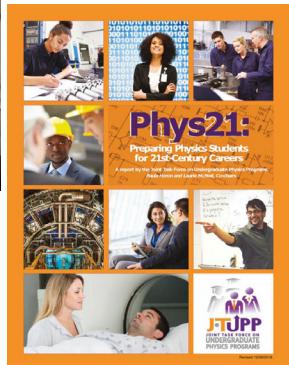
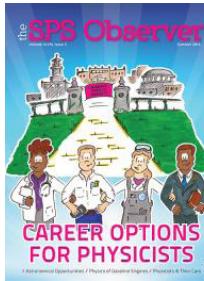
www.spsnational.org/the-sps-observer/winter/2015/navigating-failure

- **Communicating Research – the SPS Observer Special Issue**

www.spsnational.org/the-sps-observer/issues/spring-2015

- **Building community within a department:**

www.spsnational.org/the-sps-observer/summer/2017/building-community-crossing-boundaries



Visit 

www.spsnational.org/career-resources

SECTION 1: EXPLORING OPTIONS & FINDING OPPORTUNITIES



Exploring Options & Finding Opportunities

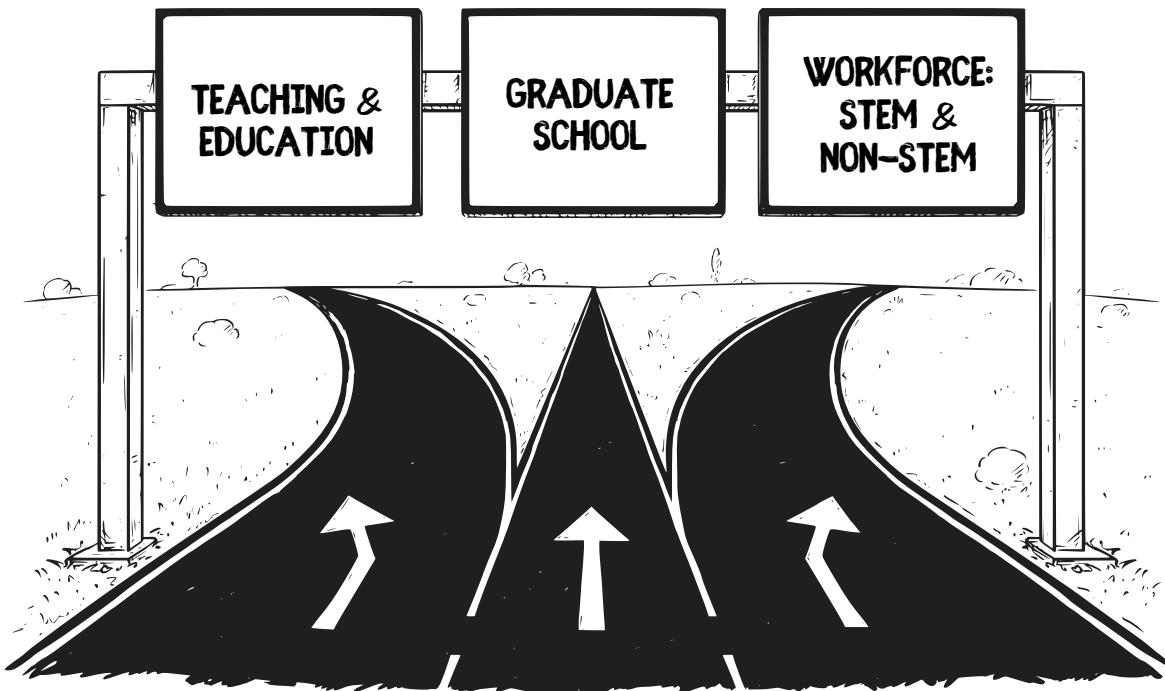
First, the good news—a bachelor’s degree in physics can lead to a wide variety of options. The challenge — successfully navigating all of the available opportunities – can be overwhelming. The AIP Careers Toolbox is focused on helping you explore your options and enter the workforce after graduation. The tools and life skills presented here can be applied to finding internship or research positions, gaining admission into graduate programs, and securing a full-time position after graduation.

Because there are so many possible pathways available, deciding on a good fit for your unique set of knowledge, skills, and (most importantly) interests is difficult for many students. This section is designed to help you learn about some important resources for exploring options and tips for finding (or creating) opportunities.

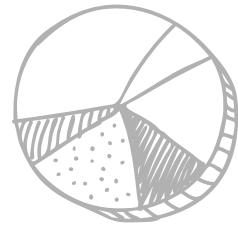
Where do physics graduates go?

From Figure 1, we know that nearly half of all physics bachelor’s degree recipients directly enter the workforce after graduation. That is very surprising for many to hear. What is often more surprising is that the private sector is the most common employment sector. For those immediately entering the workforce, Figures 2 and 3 display data about the employment sectors of work found by physics graduates (those with a bachelor’s degree). Figure 2 specifically displays the initial employment sectors for the classes of 2015 and 2016 combined. The largest area for employment of physics graduates is the private sector (about two out of every three students), with others finding work in government, academia, the military, or teaching positions. **The most likely outcome for a physics major is in the private sector.**

Figure 3 outlines the specific fields physics majors enter in the private sector for the same group and highlights a wide range of pathways. Nationally, of those that find positions in the private sector, we see that most of the jobs are found in engineering and computer or information systems. Evidence shows that the opportunities can vary by geographic location.



**AIP Statistical Research Center data you can checkout:
www.aip.org/statistics**



Typical starting salaries

New physics bachelors entering the workforce receive some of the highest starting salaries of any undergraduate major!

Private sector positions tend to pay the most of the listed employment sectors.

“Who’s Hiring Physics Bachelor’s?”

www.aip.org/statistics/whos-hiring-physics-bachelors

The AIP Statistical Research Center has a listing by state of physics bachelor’s employers as reported by physics graduates hired at those places.

“What’s a Bachelor’s Degree Worth?”

www.aip.org/statistics/physics-trends/whats-bachelors-degree-worth

Typical salaries for bachelor’s degree recipients, class of 2015

“Focus on Physics Bachelor’s Initial Employment”

www.aip.org/statistics/reports/physics-bachelors-initial-employment2014

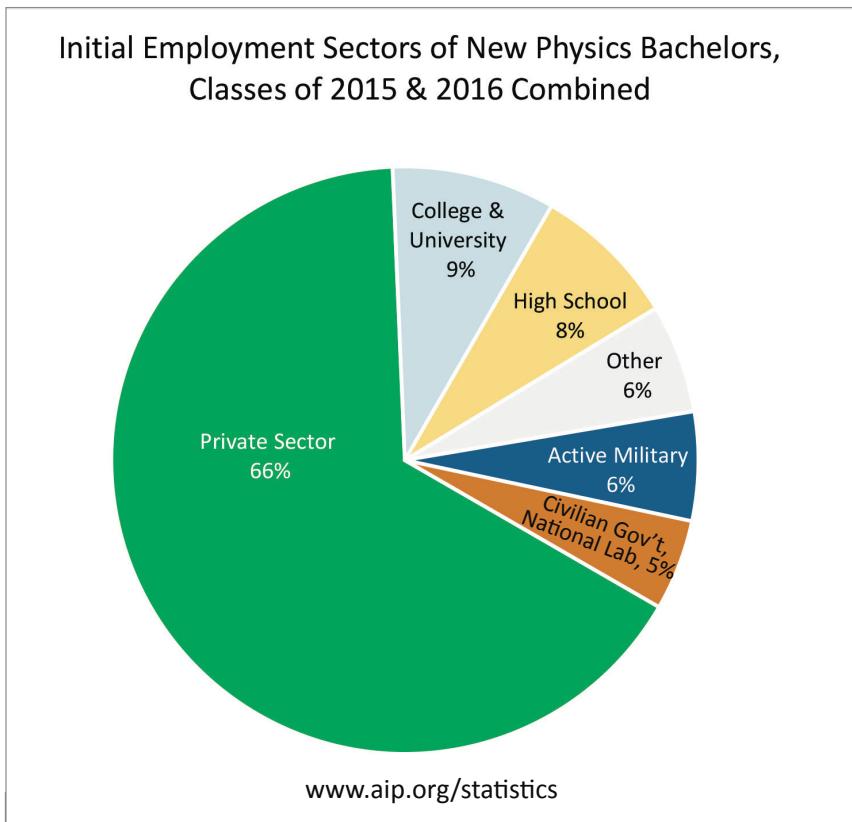
This publication examines the post-degree employment of new physics bachelors during the winter following the academic year in which they received their degrees. The report includes data on starting salaries, employment sectors, fields of employment and skills used.

“Focus on Physics Bachelor’s One Year Later”

www.aip.org/statistics/reports/physics-bachelorsone-year-after-degree

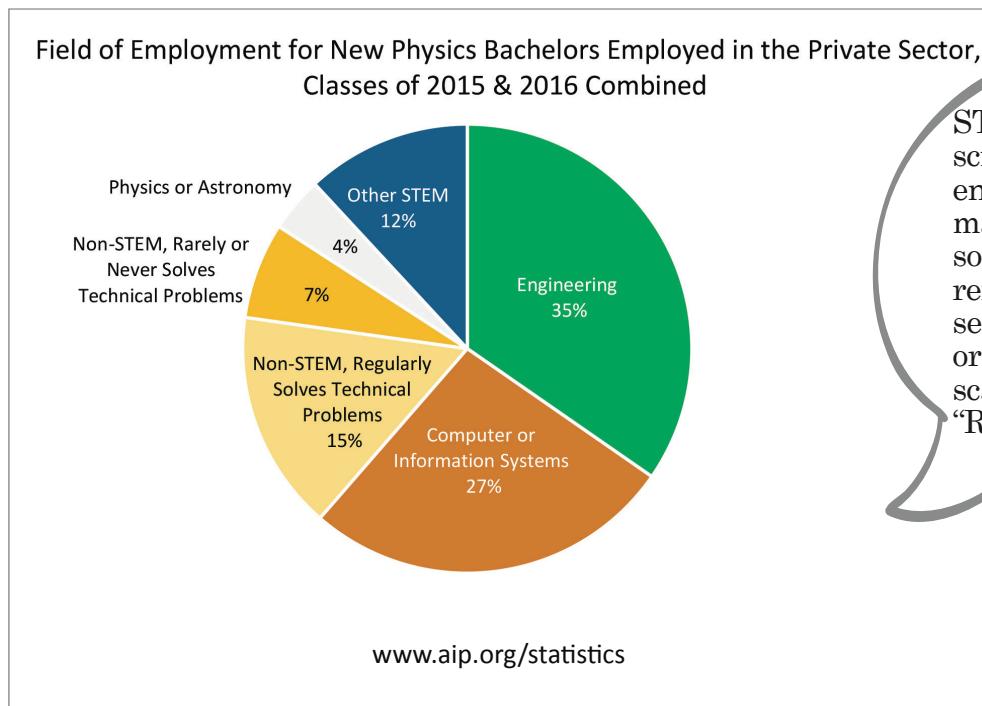
This publication examines the educational and career paths pursued by physics bachelors in the winter following the academic year in which they received their degrees. It looks at different graduate study fields, career paths, and financial support.

The screenshot shows the AIP | American Institute of Physics website. The header includes the AIP logo and a search bar. The main navigation bar has links for Programs and Resources, Publications, Career Resources, Member Societies, About AIP, and a green 'Donate now' button. Below the header, a breadcrumb trail shows 'Home > Programs and Resources'. The main content area features a section for the 'Statistical Research Center' with a sub-section for 'Focus On reports'. It highlights a report titled 'The representation of women among physics bachelors and PhDs' with a 'See the flyer' button. To the right, there is a line graph titled 'The representation of women among physics bachelors and PhDs' showing the percentage of women from 1979 to 2012. The graph has two lines: 'Bachelor's' (green) and 'PhD's' (red). The 'Bachelor's' line starts around 10% in 1979 and rises to about 20% by 2012. The 'PhD's' line starts around 4% in 1979 and rises to about 18% by 2012. Below the graph, there is a 'Browse data by topic' section with a grid of 12 items: High School, Employment & Careers, Undergraduate Education, Women, Graduate Education, Minorities, Faculty, International, PhD Plus 10, and Astronomy. To the right, there is a 'CONTACT THE STATISTICAL RESEARCH CENTER' section with address, phone number, email, and social media links. At the bottom, there are links for 'SEE ALL REPORTS >', 'More Data Resources', and 'Physics Trends Flyers'.



Note: 47% of new physics bachelors were employed in the winter following the year in which they received their degree.

Figure 2. Initial employment of physics's bachelor's degree recipients for the combined classes of 2015 & 2016



STEM refers to natural science, technology, engineering and mathematics. Regularly solving technical problems refers to respondents who selected "Daily", "Weekly", or "Monthly" on a four-point scale that also included "Rarely or Never".

Figure 3. Employment data for physics bachelor's degree recipients in the private sector. Note that Engineering and Computer Systems comprise 62% of the employment fields for bachelor's working in the private sector.

Options and Opportunities – Tool #1: Common Job Titles

One way to explore your options is to look through common job titles held by physics bachelor's recipients and see what interests you. This can help you to discover and narrow down your interests. Use the titles to identify areas in which you would like to do **informational interviews** (see Tool #2). Job titles are divided into four main areas and common job titles for each are presented.

Note that you can find physics majors in ALL kinds of professions—science writing, medicine, law, history of science, acting, music, healthcare, and on and on. This list is composed of common job titles identified by an AIP Statistical Research Center survey on physics bachelor's degree graduates from the classes of 2011 to 2015. This list is not exhaustive or exclusive but is a guide to start the process.

Common areas where physics bachelor's degree recipients find employment:

Engineering: Many physics bachelor's recipients go directly into an engineering field because of the common educational training. There are many fields of engineering, so research them.

Computer Hardware and Software: The second most common area of work for physics bachelor's recipients is in computer hardware and software, which includes programming, modeling, and simulation. "Analyst" also appears in this section because analysts often apply considerable mathematic and software skills to their work.

Research and Technical: Physics graduates often take jobs doing scientific research and working in a laboratory environment.

Education: Educators with bachelor's degrees in physics tend to teach middle or high school science. About half of all high school physics teachers in the United States teach mostly or exclusively physics. The other half also teach related subjects such as chemistry and math. There are many other opportunities available in the broad field of education.

Engineering		Research & Technical	
Systems Engineer	Application Engineer	Research Assistant	
Electrical Engineer	Development Engineer	Research Associate	
Design Engineer	Engineering Technician	Research Technician	
Mechanical Engineer	Field Engineer	Lab Technician	
Project Engineer	Process Engineer	Lab Assistant	
Optical Engineer	Process Technician	Accelerator Operator	
Manufacturing Engineer	Product Engineer	Physical Sciences Technician	
Manufacturing Technician	Product Manager		
Laser Engineer	Research Engineer		
Associate Engineer	Test Engineer		
Technical Services Engineer	General Engineer		
Education		Computer Hardware / Software	
High School Physics Teacher		Software Engineer	
High School Science Teacher		Programmer	
Middle School Science Teacher		Web Developer	
Substitute Science Teacher		IT Consultant	
		Systems Analyst	
		Technical Support Staff	
		Analyst	

Considering Teaching

In the summer of 2002, Lauren Zarandona was an outreach intern with the Society of Physics Students (SPS). Today she is a high school math teacher in Mississippi. In September 2016, Lauren was awarded the Presidential Award for Excellence in Mathematics and Science Teaching in recognition of her leadership in the improvement of mathematics education.

She took the time to talk to Summer 2016 SPS intern Victoria DiTomasso about the origins of her love for teaching, her career path, and the lessons she has learned along the way.

Victoria: Where do you think your interest in education came from?

Lauren: I always had teachers, and my parents, who let me ask all the questions I wanted. It was because I always knew that it was okay to push and do more and ask more questions and think differently that I realized that everyone should have that opportunity.

Victoria: Did you always know you would pursue a career in education? Could you walk us through your career path?

Lauren: My mom and dad are awesome, but neither of them had a college degree. I thought that getting a college degree meant having a career that people might name drop. I had this idea in my head that achieving something meant being a doctor, a lawyer, or in any career that you hear about when you're little. One that makes a lot of money. My parents are proud of me as a teacher, so I don't know why I thought a career had to look a certain way. They always encouraged me to follow my passion.

I also thought there was something lacking in a teaching position. Everyone says, "Oh you don't get paid enough," or "It's not a respected job, compared to engineering or research." I heard the negative things and took them as the truth. I wish I could have had the confidence early on to have gone with what I already knew was my passion. We shouldn't be afraid of pursuing what we're naturally inclined to like.

It was as a Society of Physics Students intern that I realized that I wanted to work with curriculum. I made a math-themed Science Outreach Catalyst Kit (SOCK) based around the math behind physics. I realized through that internship that I really wanted to work with curriculum someday. I was very inspired by the idea that people could do things better than what was already done.

At that point, I was a physics major without certification to teach. I went into an alternate route teaching program. Straight out of undergrad, I did two years in the program and got my master's.

...I stayed in my original placement for five years, and then I came to the school where I am now, which is a public residential high school that serves the entire state of Mississippi. We have juniors and seniors that are residential, so they board, and they are, for the most part, really interested in higher-level math and science courses.

As part of my job here, for the last eight years I've been in charge of running all the math contests. This year, for the second year in a row, we're holding an elementary math contest. Last year we did grades 3–5, and we created the problems for the contest and the kids came here as a field trip.

Victoria: You obviously love what you do, but can you talk about the most frustrating parts of your job?

Lauren: There's never enough time, of course. That's probably a frustration in any job that someone really enjoys. It's really easy to get overinvested and expect too much of yourself. People will always say that you can't change the world, and I don't know that I agree with them, but at the same time it's certainly not going to happen in a class period.

Victoria: What are the most rewarding parts?

Lauren: Watching the kids succeed. Today I had a student who made her first "A" on a quiz this year and she struggled to get there. Her grade does not look good right now, but she finally broke through and made that "A" because she's worked so hard for it. That was incredible.

I do it more for the kids than for myself. When I was applying for this award, a student asked me why. The reality is that if I'm constantly pushing my students to challenge themselves, then I should be doing the same thing.

Victoria: Do you have any advice for people who are trying to inspire kids and their peers to be excited about STEM?

Lauren: Never underestimate the underdog. Oftentimes outreach is focused on students who don't have a lot of opportunity and so we go in thinking that there are certain limitations to what they're capable of. And when we do that we're the ones putting a limit on them... Instead, go in thinking that even the person from the worst neighborhood, from the poorest background, has unlimited potential and it really changes what you can accomplish together.

Victoria: Is there anything you've learned as a teacher that you'd like to share with current undergraduate students?

Lauren: Kids are capable of a lot more than you think they are. I have a 6-year-old and a 4-year-old and it's incredible to see the capacity of learning that a small child has. Somewhere down the line we just forget that we're capable of so much. We get resigned to sitting in a straight row, being quiet, and following a plan. We lose the beauty that is learning and curiosity and just trying something new. I'd definitely say: Don't underestimate what you are capable of.

Exercise - Tool #1: Identifying Job Titles of Interest

Read through the list of common job titles on page 11 and circle the titles that seem most interesting to you. To learn more and explore other options, use the web tools below to read feature profiles of physicists working in other areas, see job titles of other physics alumni from your school and review research conducted by the US Department of Labor on common job titles for physics bachelor's degree holders. **Strongly consider exploring some job titles that you may never have heard of or considered.** You might find a field that fits your interests!

Other resources for finding job titles

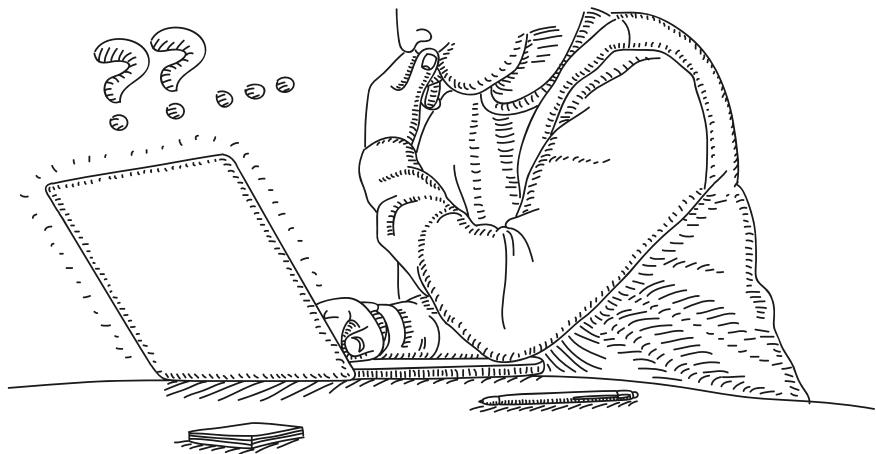
Profiles of people with physics degrees	www.spsnational.org/career-resources/physicist-profiles Careers Using Physics, by the Society of Physics Students
	www.physics.org/careerprofiles.asp Physics.org, by the Institute of Physics
	www.aps.org/careers/physicists/profiles Physicist Profiles, by the American Physical Society
	www.physicscentral.org/explore/people/ Physics Central, by the American Physical Society
Job Titles requiring physics knowledge per the Department of Labor	www.onetonline.org/find/descriptor/result/2.C.4.b?a=1
Physics alumni on LinkedIn	<ol style="list-style-type: none"> 1) At www.linkedin.com, search for your school using the top search bar. Select the correct profile page. 2) Select “See Alumni”. 3) In the top right, click “Next >” and add “Physics” under “What they studied”. 4) Adjust attendance dates to find recent graduates.
Who's Hiring Physics Bachelors?	www.aip.org/statistics/whos-hiring-physics-bachelors

- ⇒ A different way to explore job titles is to examine projects, products, and companies you are personally excited about and explore the types of positions available. You'd be surprised where you will find physicists and astronomers.
- ⇒ Also, don't forget to ask where department alumni have gone!

⇒ Select four job titles you are interested in. Spend some time exploring what someone with that title does through online searches and write down key words that describe that job below.

Job title:	Job title:	Job title:	Job title:
Key words:	Key words:	Key words:	Key words:
Organizations with this job title			

- ⇒ Do this process iteratively, exploring jobs and job titles until you find a few that seem very interesting to you.
- ⇒ You might want to develop a spreadsheet or use the online version of this form for doing this exercise.
- ⇒ You can also write down what about the job looks appealing. This can help you identify common areas or themes.
- ⇒ It never hurts to look or apply for a wide variety of positions.



Options and Opportunities – Tool #2: Informational Interviews

An informational interview is a technique used to explore the details of a *specific* job. Conducting informational interviews can help you develop a deeper understanding of a given position and give you an advantage when you start applying. Do this to investigate career options *before* beginning your job hunt. Doing your homework early will save you time in the long run.

The basic concept

An **informational interview** is a professional meeting with an individual who has a type of job that you could be interested in pursuing. **In your interview, you will** ask questions about the job and company and evaluate the extent to which your interests, knowledge, and skills match that kind of job. By conducting multiple informational interviews, you can get a good sense of a career path that you would like to pursue—and those that you do not want to pursue! You can also explore multiple career paths in a short amount of time.

Why do informational interviews?

1. Informational interviews are an ideal way for physics students to learn about different jobs. Sometimes, your faculty advisors have little experience outside of academia and so are limited in the guidance they can provide regarding the **details of specific jobs**.
2. Informational interviews introduce you to the specifics of a certain type of job—**including jargon** that may be helpful for resume writing and job searching.
3. Informational interviews allow you to see an individual in a job environment and **determine if this environment is right for you**.
4. Informational interviews provide an opportunity to **seek advice** from someone working in the field. This allows for a more informed career choice and may help guide you in your educational choices.
5. Informational interviews help you **initiate professional relationships** and **expand your network** of contacts in a relaxed and genuine way.
6. Informational interviews help you to **develop your communication skills** and self-confidence in talking with professionals in a low-pressure interview environment.

How to prepare for an informational interview

Finding people to interview

Research general career fields (e.g., engineering) and specific jobs within that field (e.g., civil engineer) using your list of potential job titles (Exercise #1). Once you narrow down the kinds of jobs that interest you, seek out potential interviewees in those areas. You can focus your attention on organizations that interest you.

Making contacts

Ask friends, neighbors, family, professors, campus career professionals, and alumni associations for suggestions of whom to interview. Many universities have a career mentoring network of alumni and professionals who have volunteered to be contacted by students to discuss what they do. If yours does, this is a great place to start. Also search your contacts on LinkedIn and other social media networks. Do not limit yourself to interviewing people with physics degrees, although such people might have useful perspectives if you can find them. Build a list of potential contacts. Identify people with shared interests, enthusiasm, or involvement. Consider people that work in a setting (e.g., office, academia, classroom, etc) you prefer.

Scheduling the interview

Once you have some names, contact your potential interviewees by email or phone. *Be sure to tell them who you are, why you are contacting them, and from whom you received their name.* Be professional, clear, and state that you are a student seeking to conduct an interview with them about their job as a means of exploring what you would like to do for a career. Request 15–20 minutes for a phone interview, or 20–30 minutes for a face-to-face interview (if the person is local). **You are not asking for a job.**

It is very important to respect an interviewee's time. With that in mind, be sure to stay within the agreed upon timeframe. Keep in mind that visiting interviewees at their workplace can be insightful, especially when assessing workplace culture. This may also be more convenient for the interviewee.

Remember that an informational interview is *not* a job interview. You can bring your resume or business cards, but avoid asking questions about whether specific employment opportunities exist in the company. Do not offer your resume to the interviewee unless they ask specifically for it.

Preparing for the discussion – Questions and topics to discuss

Because you want to be respectful of the time you take from the interviewee, you will only be able to cover a small number of issues. Prepare your questions in advance, write them down, and take them to the interview. A notepad is helpful. The guidelines below are useful to keep in mind as you prepare questions.

Table 1: Informational interview guidelines

“DOs”	“DON’T’S”
<ul style="list-style-type: none"> • Think carefully about what you want to learn before you write your questions. • Remember that you are looking for information, not a job, so ask broad questions that will result in lots of information. • Do your homework and research the individual, position, division, and company. Let your research guide your questions. • Listen carefully and ask follow-up questions when you feel it is appropriate. • Be confident! Enjoy your time talking to someone with similar interests! 	<ul style="list-style-type: none"> • Do not ask for a job, even indirectly. • Do not ask about the individual’s salary. Instead, ask about the typical starting salary for someone in that field. • Do not be on your phone during the interview. • Do not interrupt someone when they are answering your question.

Because time is short, it's important to guide the conversation and get answers to your most important questions.

Short Exercise: What questions do you want to answer for yourself at the conclusion of your interview. For example, would I enjoy working primarily in an office environment?" or "What are the challenges of a job where I have to travel a lot?" Be as specific as you can. **Note: These are not the questions you ask the person you interview.**

Question 1:

Question 2:

Example questions for an effective informational interview

The following are some suggested topics for your informational interview questions. You should plan for 4 – 6 questions, which leaves some time for follow-up questions in a 15 – 20 minute conversation.

- Typical position duties and responsibilities
- Necessary skills for this type of job
- Most satisfying/challenging/frustrating aspects of the job
- Atmosphere/culture of the work place
- Where are open positions posted in this field
- How well the job lends itself to work-life balance
- Important personal characteristics for this type of job (e.g., tenacity, creativity, initiative, leadership)
- What professional/trade associations people in this field join
- Advice for an undergraduate looking to enter this field
- Who you might contact for more information
- Advice about building an effective resume that might be attractive to the company

Conducting an informational interview

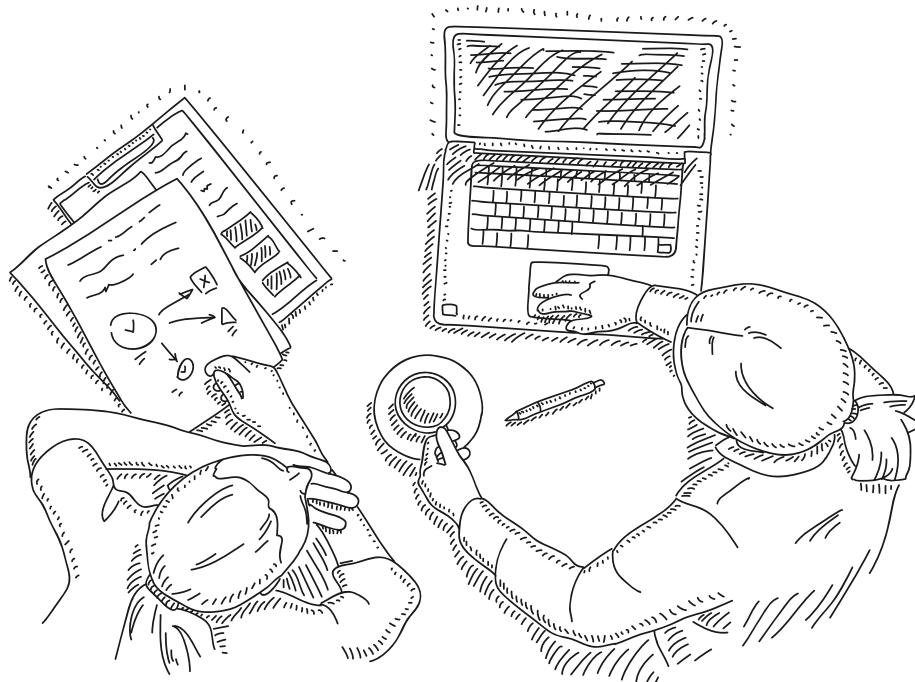
Approach the informational interview as a chance to learn and expand your network of contacts. Be polite, on time (or early!), and respectful. Dress professionally, make eye contact, and exhibit good posture. Also, be prepared to introduce yourself and give your **elevator speech** (see pages 25–26). Bring a notepad to take notes and have your written list of questions on hand.

Following up after the informational interview

Do not forget to follow up after the interview. This may be one of the most important points in conducting an effective informational interview.

- **Be sure to send the interviewer a short, personal thank you note within a few days of the interview to convey your thanks and demonstrate your professionalism. In the note, mention something that you found particularly useful or helpful from the interview.**
- **Write down what you learned and decide on next steps. For example, if the interviewee said that most people in that field are members of a specific professional society, you might consider joining.**
- **If the interviewee connected you to other people or opportunities, be sure to follow up on the leads with an email or a short note.**

Use the Exercise templates on the following pages for conducting your informational interviews and keeping records. These templates are available online.



Exercise - Tool #2: Planning For Your Informational Interviews

⇒ Carry over the job titles you are most interested in from page 14.

Job titles I am interested in learning more about:

⇒ What would you like to know about each job? Brainstorm a list of potential questions.

Potential questions to ask during an informational interview:

Spend some time finding potential interviewees in these areas. To start with, you might try your campus career center, faculty members, family, friends, and LinkedIn or other social media sites for ideas. Don't forget to ask around your network!

Potential interviewees			
Job title	Name	Email address	Phone number

⇒ Use the following pages to plan and keep track of what you learn from your informational interviews.
(You can make more copies as needed.)

Informational interview record

Informational interview with:	
Job title:	Date:
Company:	Time:
Email address:	Location and phone number:

Questions to ask:

(Large empty box for writing questions)

Notes from interview:

(Large empty box for writing notes)

Follow-up steps:

Date the thank you note or email is sent:	
On a scale of 0-10, how interested I am in pursuing a job like this:	
Additional follow up:	

Options and Opportunities – Tool #3: Gaining Experience

While employers are going to look at your major and GPA when making hiring decisions, **they will also want to see that you have practical experience where you have developed skills that are relevant to the workplace.** This experience may include: internships, co-ops, research, student teaching, campus involvement, service-learning, volunteering, military service, personal projects, entrepreneurship or others. Whether you undertake these experiences as part of your academic work (i.e., for credit) or not, you will learn valuable skills, have significant experiences for your resume and stand out to future employers. Make the most of your time in college to explore several different opportunities to better understand what is important to you in a job and have concrete examples of ways you have demonstrated your strengths and skills in various settings.

Research

While you may have encountered a sampling of experimental work in your courses, engaging in a sustained research experience over a summer or several semesters will provide you with a better understanding of what it might be like to engage in research as a career. In fact, most students who gain undergraduate research do so by working with a faculty member, often for course credits or as a volunteer. Paid research experiences are also possible, but this varies depending on lab and department. A research experience, even if it's only for a semester, is critical if you hope to attend graduate school. A research experience can enhance your communication skills, strengthen concepts learned in the classroom, and provide project based examples of your skills for your resume.

To start this process begin by reviewing the department webpages to learn about the research areas of different faculty. Then, approach one or several faculty by asking to talk about their research. Be sure to have done your homework on their specialties in advance. Bring a copy of your CV or resume with you in case you are asked for it. If the research projects within the lab appear to be interesting to you, it is appropriate to inquire about if there are any openings with the lab.

Faculty can also guide you toward other opportunities, on- and off-campus, that align with your specific interests. If you elect to apply for a competitive program like an REU, you should be prepared to spend a significant time on your application. It will likely include a resume, personal statement, transcripts and letters of recommendation.

Internships & Co-ops

Internships and co-ops are supervised, structured learning experiences in a professional setting related to your field of study. Most internships last at least one semester and require a regular weekly commitment. Internships can be either full-time or part-time. Summer is often the most popular time for students to intern. Co-ops are a unique subset of internships that require you to alternate semesters between full-time work and full-time study. Co-op students will typically take more than 4 years to graduate, but these students are also often offered full-time employment with their co-op organization after graduation. Many colleges offer the opportunity for students to earn independent study credit for internships and co-ops. Check it out!

Finding an internship or co-op is a similar process to seeking a full-time job. You will need to seek out opportunities, have a resume, and may go on interviews. Consider using many of the tools outlined in this book to help you narrow your options and secure opportunities. Your college career center should also be a valuable resource for you.

Also, don't forget to check out jobs.spsnational.org for possible positions in your local area and across the nation. SPS Jobs hosts not only jobs but internships, REUs, and co-ops!

Campus Involvement

Leadership in any campus organization, particularly national groups like the Society of Physics Students, is likely to impress employers. Consider ways you make an impact through your leadership and be sure to document your efforts and their results. This may be by recruiting members, organizing or improving an event, impacting a campus policy or developing a system to help a group run more efficiently.

Many campuses will host a student organization fair at the beginning of each school year or the start of the semester. Take advantage of these opportunities to see what exists and where you might like to get involved. Don't take this too far though! Employers would rather see you commit yourself to a small number of organizations where you are truly making a difference than see you spread too thin.

Volunteering and Service-Learning

Engaging in service to your community is an important part of being a citizen, however, it's also a way to enhance your employability. Consider investing your time in opportunities and organizations that can make the most of your interests and

skills. This goes beyond simply participating in a one-time 5k or a fundraiser. Find out what happens behind the scenes and how you can participate in the planning and execution of activities. Making the time and effort to see a service project through to completion is strong evidence for an employer that you will be an asset to their organization. A non-profit may be excited about your beginner skills with web pages or database and offer you more chances to hone and grow them than you would find in a private sector company.

Don't forget - outreach done with your SPS chapter is an important form of service!

Personal Projects and Entrepreneurship

Have you designed a web page, built an app, written a blog, built a robot or maybe even started a small business? These experiences and others where you apply your skills toward a project or larger outcome are outstanding examples of ways to foster the attributes employers are seeking. Taking initiative, securing resources, persevering through challenges and striving toward excellence are key elements of these experiences and invaluable to any employer.

Student Teaching and Teaching Assistantships

Interested in teaching as a career? Many departments often employ students to help within classrooms, grade coursework, or provide tutoring services. Inquire with your adviser and department about these opportunities. They are a great way to not only increase your knowledge of the topic, but also foreshadow a possible career in education. Teaching roles as an undergrad provide you with a way to not only learn the material but test drive careers. Also, consider tutoring, physics help labs, and serving teaching courses.

Exercise - Tool #3: Gaining Experience

Recall the key words related to the job titles you identified on page 14. These are likely the skills that employers will be seeking when considering candidates. For each key word, brainstorm experiences you can undertake to develop and enhance that skill.

Keyword: <i>ex. Communication</i>	Keyword:	Keyword:	Keyword:	Keyword:
Experiences to try: <ul style="list-style-type: none">• Present my research at the campus research festival• Write about an SPS outreach event in the SPS Observer• Help my SPS chapter apply for a grant SPS chapter award• Judge a science fair• Present Physics demos to a local school• Present a journal article to SPS chapter	Experiences to try:	Experiences to try:	Experiences to try:	Experiences to try:

Options and Opportunities – Tool #4: Networking

Having great credentials and experiences are important when you begin a job search, but networking—making professional contacts—is often just as important. Personal contacts can provide guidance and expand your access to opportunities, particularly those that may not be widely advertised.

General networking tips

Prepare an elevator speech

An elevator speech is a 30 second introduction of yourself and is so named because it should span the time you would have to introduce yourself to someone in an elevator as you ride to the top floor. In it, you should briefly mention who you are, what you’re passionate about, and what you want to do next. Make this speech personal and memorable. If the other person were to only remember one thing about you, what do you want it to be? Once you have your speech outlined, use it! See page 25 for more information.

Note to self:
Conducting an informational interview is the ultimate networking technique.

Network everywhere

Whether you are at a career fair, physics meeting, department colloquium, or a science outreach event, always look for new people to meet. Think of every event as a potential networking event. You never know when or where you are going to encounter your next colleague. Do not be afraid to tell people that you are looking for a job; most people are eager to help students if they can.

Help others

Networking is about connecting with people—not just furthering your career. When you meet

people, think about what you can offer them.

- Can you introduce them to potential collaborators, mentors, or colleagues?
- Provide them with resources or leads that might further their research?
- Offer restaurant recommendations for when they are visiting your area?

The people you meet today can be the link to your future career. Never underestimate a networking opportunity.

This approach makes networking much less intimidating and can help you form meaningful and lasting connections.

Attend regional and national physics meetings

Nearly all of the 18 SPS geographic zones host meetings each year. These are a great way to meet peers and faculty members from surrounding schools who might have insight into and connections with the local job market. Many scientific societies, such as the American Physical Society (APS) and American Association of Physics Teachers (AACT), have regional meetings that are also excellent ways to meet scientists and potential employers in your local area.

Most scientific societies host national or international meetings that vary in location annually. When a national meeting is located in close proximity to your school, make an effort to attend. For example, the APS, the AAPT, the American Astronomical Association (AAS), and the Optical Society (OSA) all host meetings with strong undergraduate components, and all have opportunities to meet potential employers. These meetings have opportunities for undergraduates to present work, hear invited speakers, and attend workshops and receptions—all of these are great networking venues. Travel funds are available for you to report on a meeting or to present your own research: www.spsnational.org/meetings/sps-professional-meetings.

SPS National sponsors undergraduate sessions at many AIP member society meetings!

Other affinity groups also organize national or regional meetings. Be on the lookout for conferences sponsored by the National Society of Black Physicists (NSBP) or the National Society of Hispanic Physicists (NSHP) as well as Conferences for Undergraduate Women in Physics (CUWiP).

Get involved!

Attend your department, college, or university professional events. Many colleges and universities host guest speakers and invite scientists to campus events. *Make every effort to attend these events and hear the speakers.* Ask questions and introduce yourself after the event. Use these opportunities to **practice your elevator speech**. This gives you a perfect chance to follow up and connect with speakers and other professionals that you meet on LinkedIn or via email.

Ask questions!

One of the simplest ways to start a conversation is by asking, “So, what do you do?” After this, the conversation should progress fluidly if you show interest in what the person is telling you. Other questions you might ask new connections include:

- How has your physics background helped you in your career?
- What advice would you give a physics major who wants to go into your field?
- What opportunities does your company have for physics students?
- What do you like most about your career (or company)?

Listen carefully, make appropriate comments, and ask thoughtful questions. People love to share their stories, so let them and wait for an invitation to relate to your experiences. They will often ask about you in return.

Exchange contact information

If you would like to maintain a new connection, don’t be afraid to ask someone if you can follow up later by email or phone.

Business cards are an easy way to give a new connection your contact information, leave a good impression, and look professional—even if they only say “Physics Student.” When you receive a card from someone else, write a brief description of how you met the person and what you discussed on the back. For example: *aapt Summer Meeting 2017, email re: summer research opportunities.*

Network online

Stay in contact with new connections through online networking sites such as **LinkedIn**. Use key word searches on these sites to find people with your dream job or company and ask your connections to introduce you. Also ask your professors or career services office if they can connect you with **alumni** in your desired profession via email. Don’t forget about former class/lab mates!

Cultivate relationships

A person you talk to only once will not be a strong part of your network. Send updates to your connections to let them know how school is going, where you are in your search, or to pass along information of interest. Ask them about the project or life event they mentioned the last time you spoke. The idea here is to have a strong foundation with each person, not just a transactional relationship that you call on when you need something.

Project a positive attitude

Go into networking events with a positive outlook and be confident in your ability to have a meaningful conversation. When speaking, recognize that you are addressing a colleague: avoid negatives or self-depreciation (e.g., “I could never do that” or “You know so much more than me”). Think through your approach and prepare for networking opportunities before they arise. Being prepared will help you be more relaxed when you meet new people. Enjoy the opportunity to talk to new people; you never know when you will meet someone that can connect you to your next job. Have a good sense of humor and an enthusiastic attitude. Get out there, have fun, meet people, and make new connections!

More about the elevator speech**What is an “elevator speech”?***The basics*

- An elevator speech is a 30-second snapshot of who you are, what you’ve accomplished, and where you hope to go in the future. This short speech is your time to highlight your relevant skills, education, and experiences.
- The idea of the elevator speech stems from the length of time you might spend on an elevator with a potential networking contact.
- You should practice your elevator speech several times so that you can easily recall the highlights when an opportunity arises; however, you do not want to sound too rehearsed.

- Think of the elevator speech as a short conversation with a purpose.
- Only use terms you think the other person is comfortable with. Avoid jargon and acronyms.

What is the point?

Let's say that you are on an elevator or standing in line for coffee at a meeting, and you notice that Nobel laureate John Mather is standing next to you. Maybe his nametag tips you off, or maybe you recognize him from a talk he gave...What do you do?

You could:

A. Get out your cell phone and post on your favorite social media channel that you are standing next to a Nobel laureate.

OR

B. Create an opportunity for yourself that could influence your future.

Since you are a resourceful person, A is out of the question. You choose B (or "C. Both A and B"). So, how do you do this?

Give Your Elevator Speech. The elevator speech is a professional way of introducing yourself. *The trick is that you've previously rehearsed what you want to say.* The goal of the elevator speech is to quickly demonstrate your interest and professionalism in the hopes of engaging the other person in conversation.

Hi, Dr. Mather! My name is Phyllis Physics and I am at Einstein University studying Physics. I'm in my junior year and I'm very interested in working in science policy when I graduate. Currently, I am serving as outreach coordinator for our SPS chapter. We just hosted an amazing event for 500 local middle school students. I am actively seeking summer internship opportunities and heard about the SPS Summer Internship program in Washington, DC. Could you tell me more about it?

Note: You need to develop several elevator speeches, each needs to be aimed at a different audience. For example, if you are undecided between attending graduate school and starting your career now, have an elevator speech related to both options. You can decide which one to present based on the person standing in front of you. If you plan to present your elevator pitch to someone from a specific organization or company (like a representative at a job fair), be sure to consider what they are seeking in an employee and what you can contribute when you draft that version. Most professionals have several elevator speeches prepared that begin with something like, "Hello, my name is _____ and I am from _____ (company/school)..."

Another reason to have several speeches prepared is that not everyone has the same background information and vocabulary. For example, imagine if instead of Nobel prize-winner John Mather, you meet the U.S. Secretary of Energy or the head of a national lab. Each would have very different educational backgrounds and it's important you explain yourself in a way that delivers your main message: **What are you passionate about and where do you want to go next?**

Even though you have only a short time span, the elevator speech is an ideal time to share any relevant research and internship or work experience, in addition to any interesting skills or knowledge you have. Think of your elevator speech as a conversation opener that invites the other person to ask for more.

Your elevator speech must explain:

- Who you are
- What you've accomplished
- Where you hope to go
- **What you are passionate about**

And, if that wasn't enough, you need to highlight:

- Your Skills
- Education
- Experiences

What to consider when giving your elevator speech:

- Take into account who your audience is
- Give an explanation using only words they already understand
- Relate what you do to something they know
- Highlight your accomplishments

And you need several different versions for different audiences:

- a technical audience – a scientist in your field
- a generic scientist not in your field
- someone with no science background
- a potential job lead

Exercise - Tool #4: Networking Skills – Constructing Your Elevator Speech

⇒ Write down short answers to the following questions. Remember, you want to answer these questions in a coherent way that highlights your potential *in 30 seconds*. Stick to the basics. Avoid elaborate embellishments. You can always fill in details if the conversation continues.

Informational facts about you

Who am I? (Include your name, major, and where you go to school.)

What are two relevant or interesting things that I have done recently?

What am I passionate about? What do I want to accomplish in 15 years?

⇒ Use this data to present yourself. Try arranging the facts in a few different ways until you find one that feels natural and engaging. Write the outline below. Then repeat this process for a more specific type of audience (potential employer, informational interviewee, or advisor).

General audience elevator speech (1):

Specific audience elevator speech (2):

⇒ Practice verbalizing your speech, but don't memorize it word-for-word. You want to be comfortable with the main points but flexible enough to engage in a natural conversation and adapt to the interests or background of the person with whom you are interacting. Being sincere is important.

The most important points are to
transmit your passion and to make a
lasting connection.

SECTION 2:

ASSESSING YOUR KNOWLEDGE AND SKILLS

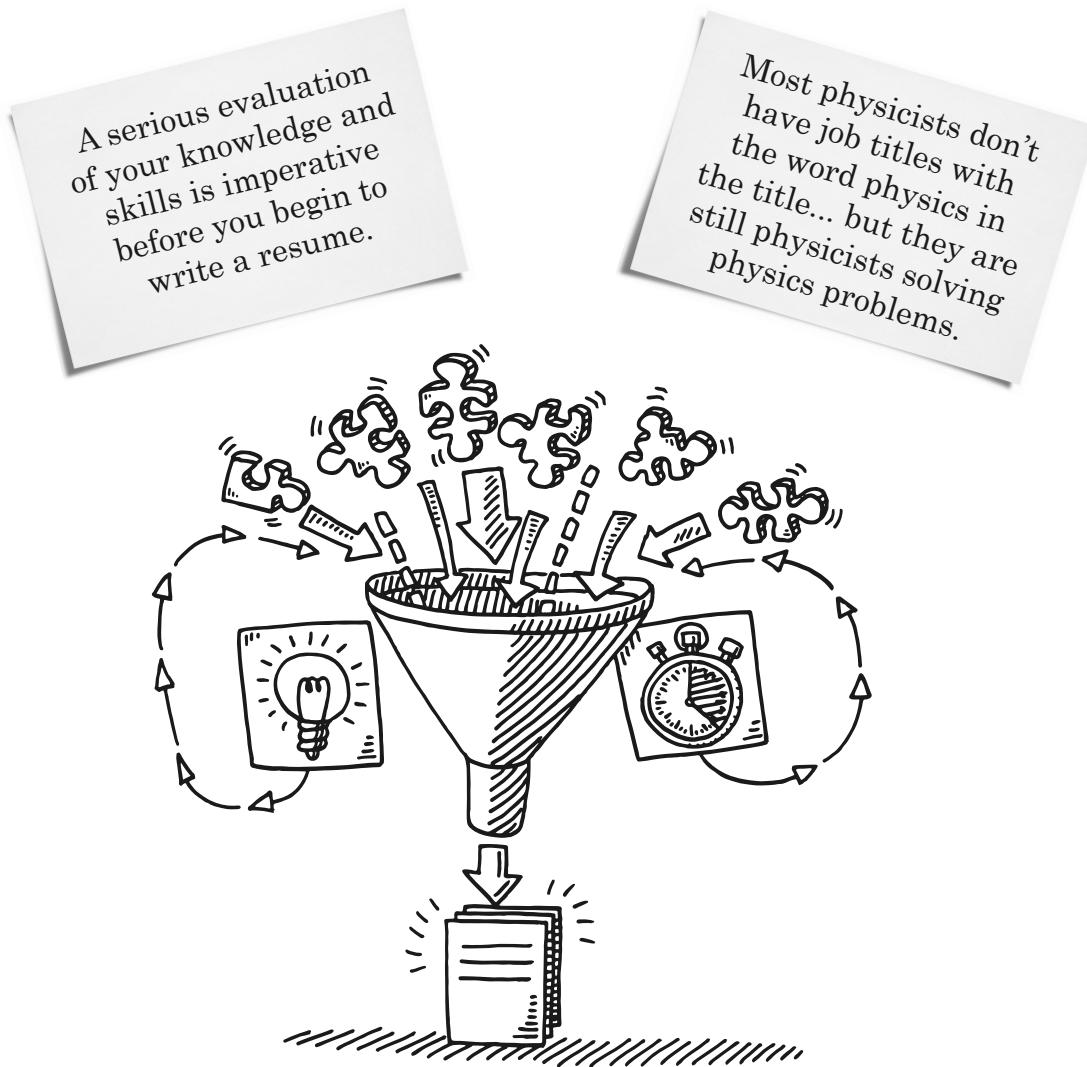


The Missing Link: Assessment and Articulation of Your Knowledge and Skills

As a physics student, you have a robust set of skills and are prepared to tackle a wide variety of jobs. It is important to realize that most jobs currently occupied by physicists do not contain the word **physics** or **physicist** in the title. Knowing this is important however, makes it no less challenging to effectively convey your skills and knowledge in a way that is meaningful to someone unfamiliar with the experiences of a physics student. While specific classes and curriculum may differ from school to school, there is a broad common experience among students who study physics and complete a bachelor's degree. This section aims to help you translate these skills and knowledge to a broad range of fields.

To convince someone that the knowledge and skills that you have gained through attaining a physics degree are a great match to a specific job, you must clearly communicate not just what you know, but **how your knowledge can benefit an employer**. This section is about how to assess your knowledge and skills and draw on your experiences (courses, lab and work experience) as evidence of your skill set and what you have to offer a potential employer. Physicists and astronomers have many transferable skills. Transferable skills are skills that are learned in one environment but are easily translated to another, completely different, area. A good example of a transferable skill is problem solving.

When you have a clear idea of what you know and how that knowledge and skill set can be applied to a given position, you have the tools to convince employers that you are a viable candidate through your resume, cover letter, and interview.



Tool #5: Identifying your skill sets

As a physicist, you possess a unique set of skills but it can be challenging to articulate those skills for the different job opportunities you may pursue. Many jobs you apply for will be labeled something other than “physicist.” **That’s ok!** In order to stand out among a pool of applicants, you must be able to competitively represent yourself on paper, through a resume and cover letter, and in person, through networking opportunities and interviews. In addition, you need to know how to do so accurately and succinctly. This means that you must figure out who you are and what you know. As a physics major, you have unique knowledge and skills that are valuable in the job market.

The goal of this section is to learn how to articulate your **transferable skills** in a way that makes it obvious to an employer that you are the right person for the job that they are hiring for.

Skills and knowledge evolve and develop over the course of your education in several ways:

- Mastery of introductory and advanced lab courses
- Development of communication and professional skills through internships, research, service and other experiences
- Active participation in extracurricular activities
- Familiarity with broad and advanced problem-solving skills across a wide variety of topics
- Assuming leadership roles and/or taking initiative (learning to self-direct)
- Experiencing a diverse range of group and team experiences
- Completing projects that achieve a defined goal

Departments who have been recognized as being successful in helping students secure post-graduate employment typically offer the following experiences to further these skills in students.

From courses and lab work:

- Varied and high-quality lab courses
- Research opportunities for undergraduates
- Curricular flexibility and computational coursework embedded within classes
- Building communication skills as part of the undergraduate physics experience

Outside the classroom:

- Faculty and staff commitment to physics majors’ success at all levels, regardless of career goals
- Strong community of students within the physics department
- Opportunities for physics majors to be involved in outreach activities

Many of these features are consistent with those identified in thriving physics departments in the SPIN-UP report:

www.aapt.org/Programs/projects/ntfup/

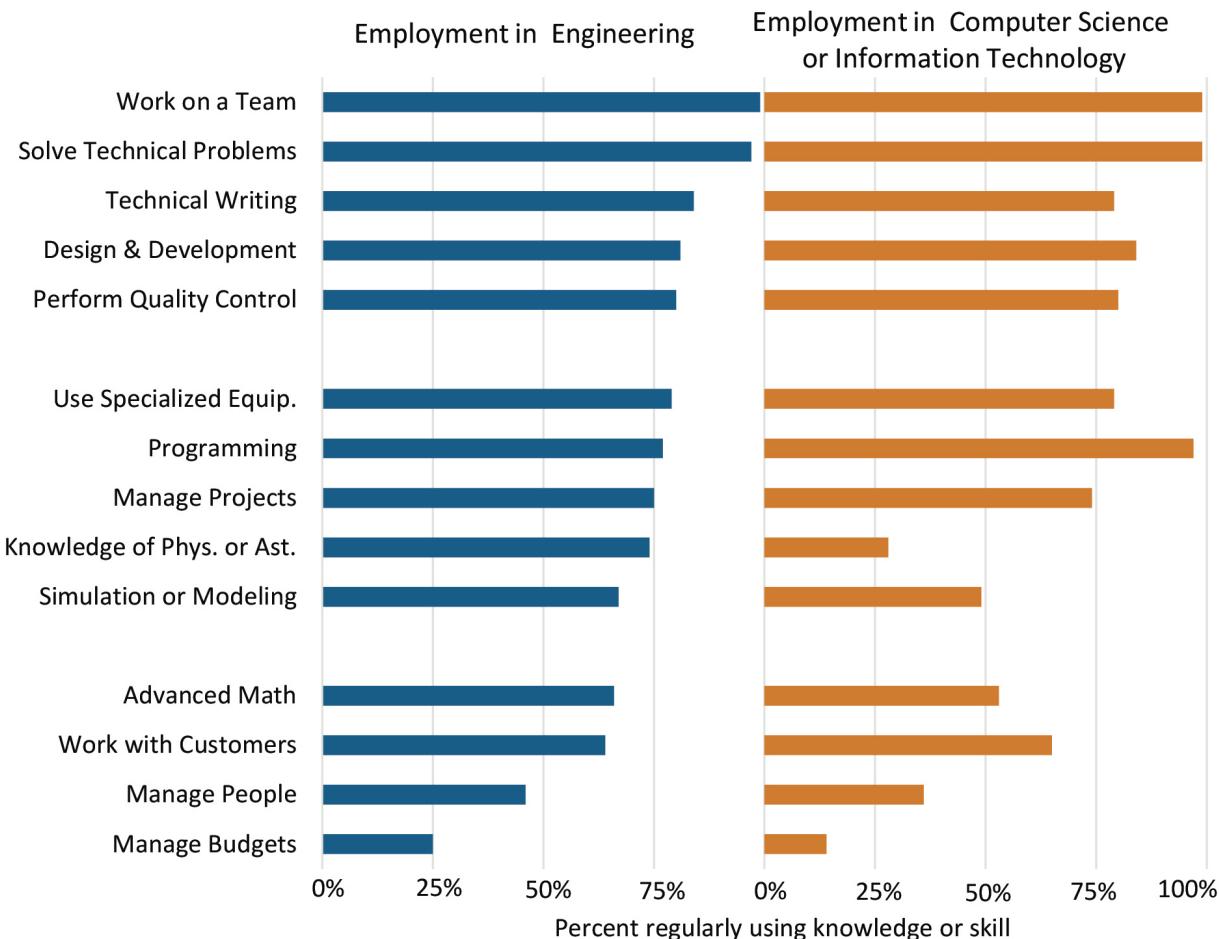
Each of the curricular or extracurricular components contributes something different to your set of knowledge and skills and could be a potential point in your resume or CV. You may be surprised to find how well skills can translate from one job or position to another.

Figure 4 displays information gathered from physics students who graduated and were employed in engineering and computer-related positions in the private sector. They were asked how often they used a given list of skills, including items such as technical writing and working on a team. These students graduated with a degree in physics and reported through an AIP Statistical Research Center survey of employed bachelor’s degree recipients.

These results are surprising to many students, not because of the skills listed, but the ranked order in which they are reported. Being able to solve complex problems, work on a team, communicate effectively through technical writing and make decisions about the effectiveness of tools and procedures top the responses.

An even more surprising result for many students is that the typical courses a physics and astronomy student take train them very well for the most useful skills and knowledge cited. Laboratory experiments, theoretical courses, and research experiences are great job training activities. Let’s explore how...

Knowledge and Skills Regularly Used by New Physics Bachelors Employed in the Private Sector,
Classes of 2015 & 2016 Combined



www.aip.org/statistics

Figure 4: Recent data listing skills commonly used by physics bachelors in the workplace for the combined classes of 2015 & 2016. Percentages represent the physics bachelors who choose “daily”, “weekly”, or “monthly” on a four point scale that also included “never or rarely”.



Working on a team and solving technical problems are some of the most useful skills physics majors can offer potential employers.

Assessing your own skills and knowledge

The first step in assessing your skill set is to consider the broad categories of skills that physics students commonly develop and how to express them in language that is meaningful to employers. This may not be obvious but can be learned.

Identifying, assessing, and writing down your skills can be time consuming but is one of the most efficient ways to increase the odds of landing a job that is a good fit for you. You must also be prepared to repeat this self-assessment process as you progress through school, adding to and refining your list of knowledge and skills.

This assessment process is key because these skills form the basis of your resume, cover letters, and interview talking points. By carefully examining your own experiences, you can extract your personal knowledge and skills and learn to express your capabilities in ways that are meaningful in the job application and interviewing process.

Below are some examples of common skills sought by employers and how you might acquire them during your undergraduate experience.

Skill: Working with laboratory instruments

Students who are pursuing a major in physics often have a wide variety of laboratory experiences. Virtually all physics curricula require students to take a lab with the introductory courses and as a part of a senior thesis or a capstone project. Many physics departments have labs during the 2nd and 3rd years as well. Astronomy courses are often laboratory-based. In addition, many students participate in research experiences that deal extensively with research equipment or computer programming. Through these experiences, students learn how to use a variety of different instruments (e.g., optical components, electronics, machine shop tools, vacuum systems, telescopes, spectrographs) and often develop skills related to their operation, maintenance, repair, quality control, and troubleshooting.

Skill: Conducting research

Many physics majors participate in open-ended research. This includes on-campus experiences with professors, off-campus research experiences (maybe as part of a Research Experience for Undergraduates program or an internship), working on an independent research project, or working on a project for a specific course. Research experiences engage students in higher-order thinking skills and complex knowledge, including research design, data analysis, creative thinking, critical thinking, error analysis, and problem solving. An often-overlooked skill developed through conducting research is the ability to find, read, analyze, and interpret relevant background information to simplify a problem. **Physics majors are trained in encountering problems that cannot be solved by an online search or looked up in a book.** This is useful in a wide variety of settings.

Skill: Proficiency with computer hardware and software

Studying and conducting research in physics often provides opportunities for students to develop knowledge and skills in computer hardware and software. Many physics majors write new code or modify existing programs, use statistical analysis software, or use modeling, image processing, and simulation techniques for research activities. In addition, many students use programs like LabVIEW or Python to run equipment, take data, or build specialized interfaces for this purpose. **Programming is a valuable skill.**

Skill: Effective communication of complex ideas

All students need to develop good written and oral communication skills during their undergraduate career. Physics students are no exception. You have likely had a lot of experience presenting complex information or ideas to a wide variety of audiences. Beyond the general education requirements, physics students usually develop **written communication skills** through writing technical lab reports and research papers that are part of the required curriculum. Physics students may also have the opportunity to publish research in a professional journal or to write about science for a nontechnical audience, e.g., a school newspaper or website. **Oral communication skills** are developed when you present research or class work via a talk or poster presentation - another common experience for physics students. Students in physics often further develop these skills through regular presentations to a research group or as part of a journal club. Many students also attend regional or national professional meetings where they present research findings.

Skill: Analysis and quantitative thinking

Physics students have a demonstrated ability to apply mathematics to a variety of practical problems in industry and otherwise. When seeking employment in a science, technology, engineering, and mathematics (STEM) field, application and synthesis are especially important. Employers value the analytical skills that help people manage information effectively, think logically, and interpret data. The ability to analyze quantitative data helps in examining a problem thoroughly and developing potential solutions. The quantitative physics intuition that students possess is developed over years of physics coursework, endless hours of homework, and *unique* problems. The ability to analyze information and determine what is and is not relevant is also developed over years of laboratory work and problem solving. Merely knowing what one doesn't know can be a huge asset in the workplace.

Skill: Working with others

Many students are members of a research team, are active in campus organizations like the Society of Physics Students, and have extensive experience with group projects. Do not underestimate the importance of these experiences and skills. Teamwork, collaboration, leadership, and decision making are important skills to employers that are evidenced by examples of effective group work. Working with others is often one of the most challenging aspects of a job. Developing this skill takes many forms: from helping to put on a demo show to designing a set of experiments.

Skill: Problem solving and critical thinking

Underlying many of these skills is the ability to examine a situation, identify problems, and think creatively about potential solutions. Physics students do this again and again in labs, research, group projects and homework. You have also learned how to find solutions through literature and online searches, collaborating with colleagues, experiments, and reasoning. This skill is incredibly valuable to all types of employers because problem solvers save employers time and money.

Important notes about this list: Each entry on this short list should be considered as a "set" of skills. You may have several specific skills that fall into a particular skill set 'category'. Also note that this list is not exhaustive. There are a number of other important skills that you might possess and that may be useful to a potential employer. This list represents data obtained by surveying physics bachelor's degree holders who have entered the workplace, and should be considered as a starting point.

Summary:

Commonly used skills for Physics Bachelor's Degree Holders in the Workplace

- ⇒ Communicating complex ideas
- ⇒ Analysis and quantitative thinking
- ⇒ Working with others
- ⇒ Problem solving and critical thinking
- ⇒ Working with laboratory instruments
- ⇒ Designing and conducting research
- ⇒ Proficiency with computer hardware and software



Exercise - Tool #5 – Part 1: Brainstorming your experiences

Before you can do an assessment, you need to recall the experiences where you acquired your various knowledge and skills.

Brainstorm away.

The first step is to make an exhaustive list of your experiences that may have some relevance to your job. Your life experience is NOT just a list of courses. Instead, focus on the skills/knowledge that you achieved in the classes/labs, etc. The same is true for any work experience (whether paid or volunteer), leadership experiences, clubs, events sponsored by organizations in which you have been actively involved...and many others. Keep a master list of everything you've done because you won't remember everything months or years later.

Focus on skills, knowledge, experience, and projects on your resume.

Be specific.

⇒ Focus on making notes about the experience AND the knowledge/skills gained. This means making notes about your level of expertise or breadth of experience that has led to a skill or some knowledge that you possess. Even a few sentences can be helpful down the road. Projects are great items to illustrate your skills.

Make use of your immediate network – your classmates and colleagues.

⇒ Consider working with a group. This is a great exercise to do with a study group, or even in an SPS chapter meeting. Working with a group of students who have shared classes, labs, and extracurricular activities with you can be a great way to help remember all the things that you have accomplished as a student. It can also give you ideas about things you might **need to work on** to expand your experience and increase your set of knowledge and skills.

Try to stay organized.

⇒ Use the template below to organize your life experiences. You should feel free to reconfigure this table in a way that makes it easier for you. Remember the exercise templates are available online if you would rather do an electronic brainstorm sheet. **You may have some experiences that fall into more than one category.**

Experiences (template)

Classes / training / workshops/ tutorials	Leadership experiences / group activities / professional associations / clubs and societies
Jobs: research experiences / internships / volunteer work	Hobbies / clubs / independent projects / other activities

Exercise - Tool #5 – Part 2: Identifying Skill Sets from Your Experiences

The next step is to carefully review your list of brainstormed experiences to identify your strengths and skills.

- ⇒ Think about those experiences as you review the list of skills on page 30. Think about which skills you may have acquired as part of a particular experience. For example, many lab courses require group work, so this falls under the working with others skill. Most of your experiences will have provided you the opportunity to acquire multiple skills.
- ⇒ Identify skill categories which are prevalent among your collection of experiences. For example, if much of your coursework, laboratory work, and summer research involved computation, “proficiency with computer hardware and software” might be a good place to start.
- ⇒ Write the skill set category that you have identified at the top one of the pages labeled “Identifying My Skills – An Assessment Worksheet” (page 36).
- ⇒ You are now ready to begin using the worksheet to flesh out the specific details about the particular skills in that category. Follow the “Skills Assessment Activity Guidelines” (next page). These guidelines will take you through a simple process to refine your experiences and identified skills into polished statements ready for your resume, cover letter, or interview questions.
- ⇒ Note: You will repeat this process several times, identifying skills that you found in your brainstormed list of experiences. By the time you graduate, you should have a well-honed bullet point list of 8–12 well-articulated skills. Remember, you may have several specific skills that fall into a single skill set category. For example, you may have several unique skills related to “use of laboratory instruments.”
- ⇒ Make extra copies of the pages entitled “Identifying My Skills – An Assessment Worksheet”, since you will want to reiterate this process as you grow professionally, have new experiences, and attain new skills. You should revise your skills assessment every semester.



Aside:

While you might have many skills, also take the time to think about what you enjoy doing. Almost as important is reflecting on a why you enjoy certain activities. Your mental health and personal preferences are important and deserve consideration. You are not a title or a job.

Skills Assessment Activity Guidelines

1.

Carefully examine your experiences.

Identify one of the commonly used skills that appears among your collection of brainstormed experiences. Write this skill at the top of the "Identifying My Skills -An Assessment Worksheet". Remember that these are broad categories. You may identify other important skills on your own.

2.

Using your brainstormed list of experiences, write down all the experiences that are related to the building of the skill you have identified.

Often, these experiences will be listed in more than one of the categories while brainstorming. List all the experiences that contribute to the development of the skill or skill category that you are working on. Be sure to **consider not only classes**, REU or internship experiences, summer jobs, teaching or research assistant experiences, but also club activities, outreach experiences, volunteer experiences and other related hobbies and projects. Study this list of experiences that are related to the skill, and start thinking about how you might tell someone (a potential employer) about this skill that you possess.

3.

Narrow it down.

Once you have collected the experiences that have contributed to the skill, you are ready to draft a bullet point related to this skill that you might use on a resume. Keep this **short and to the point**. You will refine this later, so just go for it!

4.

Refine the language.

Starting with draft one, begin to refine your bullet point, focusing on a concise statement that states *what you know how to do and how well you know how to do it*. This may take several drafts. Get feedback from peers and advisors on which is most clear, concise, and meaningful.

Wording suggestions: Took data, made measurements, built, assembled, repaired, interfaced, performed troubleshooting, maintained, designed, calibrated, trained others, taught, investigated, wrote, organized, led, provided support, managed, coordinated, analyzed, presented, modeled, processed, constructed, oversaw, modified, simulated, collaborated with, solved...

Tips on explaining how well you know how to do something

Words like expert and proficient are vague and do not tell employers very much. Instead, describe your experience quantitatively or give evidence of your expertise. Possible quantitative descriptors: several times over the course of a semester, daily during the internship, x hours, x times... Possible evidence of expertise: trained colleagues, taught introductory students, published a paper...

5.

Tell your story.

Once you have the concise statement that will go on your resume, write down a few specific anecdotes that demonstrate and illustrate your experiences related to this skill.

Go back to your experiences: Write down specific examples that demonstrate how you made use of this skill or how you attained it. Think about how these examples might help you answer some of the common behavioral interview questions.

Identifying My Skills – An Assessment Worksheet

Use the skills assessment activity guidelines to work through the process of developing a skill statement for your resume.

Skill category: _____

Back to brainstorming: Write down all the experiences that are related to your attainment of this skill.

Tell it: Draft a bullet point related to this skill.

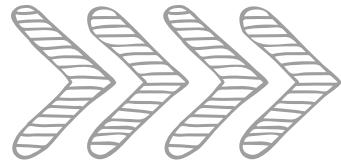
Refine the language: Rework your bullet point, focusing on *what you know how to do* and *how well you know how to do it*. You may want to do a few drafts and get feedback from others on which is most clear, concise, and meaningful.

Show it: Write down a few anecdotes that demonstrate your related skills.

My Skills Summary (Start on page 35)

Skill:	Story:

SECTION 3: GETTING TO WORK



Getting to Work – Tool #6: The Job Search Strategy

Now that you have explored your options and assessed your skills, abilities and interests, you are ready to begin the process that most people associate with finding a position.

Students who have not done the exploration and assessment that you have may believe that the best way to find a position is to saturate the market with as many resumes as possible. While this method *might* work, students who take the time to truly find the positions that fit them and their skills and then customize their resumes, cover letters and other documents to fit the qualifications are much more likely to succeed. In this section, you will find tools to help you make your search more effective.

Physicists can apply to a wide range of position and being able to focus the search can really help.

It is often said that finding a job is just as much work as taking a class! Finding your first job with your physics degree could take a semester or even longer. Success in your search depends on doing your research to find positions that match your skill sets and interests so that you can put together the most effective cover letter and resume for each specific position. Then you can be ready to have a positive interview experience. After spending the time to work through Tools 1-5, you are ready to take on this challenge.

Students who plan a structured, strategic approach to finding positions and give themselves concrete goals throughout the process are positioning themselves for success. For at least **one semester prior to your graduation**, consider setting these goals as you prepare to carry out your search:

- Attend multiple networking events – this can take many forms, such as going to career service sponsored events, going to professional society meetings, or receptions after talks
- Follow up with any contacts made at those events within one week
- Set up 3 online search agents each semester
- Update your LinkedIn profile (each semester)
- Reach out to 2 recent school alumni to learn about potential opportunities through information interviews
- Apply to at least 3 job ads that match your experience and for which you are qualified, each week
- Research prospective employers, aiming to learn about 2 companies each week

Like forming a great study group, working with other students can make the job search more successful. This provides a means of holding yourself accountable to meeting these goals. Consider forming a weekly “Jobs Club” within your SPS Chapter to connect with other students who are seeking employment. Share the goals you have set for yourself and encourage one another to work your plans and meet your deadlines.



Mental Maintenance... when looking for a job

By: Dwight E. Neuenschwander, Professor of Physics, Southern Nazarene University, Bethany, OK

A few years ago I was asked to speak at our university's annual "senior farewell" convocation. To these students about to graduate, I said that after they received their diploma and walked down the steps of the platform, at the bottom of those steps would be an invisible Ferrari that would take them, faster than they could imagine, into the future. As Pink Floyd presciently warns us,¹

And then one day you find

Ten years have got behind you

No one told you when to run

You missed the starting gun...

As freshly minted graduates proudly waving our new diplomas, we don't want to miss the starting gun. For most of us that means immediately finding a job.²

Job-seeking can be frustrating and stressful. But it can also be an adventure. I am reminded of Esther Dyson's advice delivered in a commencement address to Carleton College graduates: "Worry about your fourth job, not your first. The first job is just to get your foot in the door. Don't expect to enjoy it. Use your first job as training to find out what you can do. The first job also gives you a better bargaining position when you are looking for the second job. And so it goes. If you are still unhappy with your fourth job, then you have a problem."³ To Esther Dyson's wise advice we add a few more suggestions for maintaining balance during this stressful and adventurous time:

1. Know who you are. Inside every physicist there also lives a musician or an artist, a hiker or a cyclist. To be a whole, interesting, authentic person, those other selves need space to grow and thrive along with the physicist. Tend to them and listen to their voices. In job interviews, if it feels like the corporate culture doesn't fit you or the recruiter is looking for someone that you are not, be careful, because trying to be somebody else is not the road to fulfillment. Inventory your passions and articulate your goals. Do you most love working with people, with things, or with concepts? Which do you most value—security or adventure? As Parker Palmer observes, "Before I can tell my life what I want to do with it, I must listen to my life telling me who I am."⁴

2. Keep everything in perspective. Life, your career and physics are too important to be taken too seriously. If your self-worth depends on the perfect job offer, that's a formula for disappointment and frustration, because the perfect job does not exist. Job-seeking can raise doubts and fears. They are normal; deal with them but don't over-rate them. You have much to offer. Don't compare yourself to others—no matter how good you are, there is always someone better; but that isn't the question. Being another Richard Feynman is not the measure of success; we already have Feynman. Rather, we need you to be *you*. You have a unique set of experiences and passions and skills to offer. The world needs very few geniuses. But it desperately needs a deep bench filled with people of integrity who are teachable, honest, and can be counted on to follow through.

3. Despite our best efforts, some developments are outside of our control. During the job search process there will be times when an employer's organizational needs, timelines or budgets change. Frustrating as this may be, remember that it's not personal. Don't make a drastic impulsive decision based on how you feel at the moment. There will be times when you feel like this process into which you have invested so much time, expense, and emotional currency has been futile. Self-pity is counter-productive. Pick yourself up and move on.

4. Determination and grit are virtues—but use them wisely. The job search process can feel overwhelming – for many freshly minted graduates this experience may be the first time when the next step is not clear. It can be baffling to know where to start. But it matters little *how* you start; what matters is *that* you start—you will have to improvise your game plan as you go along anyway. Having started, turn on the persistence and determination. Dig out the information you

1. Lyrics excerpt from "Time" on Pink Floyd's *Dark Side of the Moon* album (Columbia Records, 1973).

2. I like to ask my students, "As soon as you graduate, you are volunteering with an NGO in Asia or South America, or touring Europe on a bicycle, or going to the Serengeti and photographing lions, right? If not then, when will you do it?"

3. Esther Dyson, quoted in a letter of Freeman Dyson to a class, in *Dear Professor Dyson: Twenty Years of Correspondence Between Freeman Dyson and Undergraduate Students on Science, Technology, Society and Life*, D.E. Neuenschwander, Ed., World Scientific (Singapore, 2016), 72.

4. Parker Palmer, *Let Your Life Speak: Listening for the Voice of Vocation*, (Jossey-Bass, San Francisco, CA, 2000).

need, consult with people you trust, and keep going. Persistence ultimately pays off every time. Having said that, also remember to study the difference between persistence and stubbornness. Don't be afraid to change course if an unexpected opportunity presents itself.

Having determined to be persistent and followed through, remember that setting aside periodic downtime is not goofing off – it's mental maintenance. The job search process is a marathon, not a sprint. The best runners know to give themselves days of rest so they can be at their best when it's time to perform. Remember to nurture those inner selves.

5. Help is all around you—use it. Besides standard venues such as job fairs and conference placement centers, be alert to informal, personal pipelines. They may come in the form of conversations with a neighbor already in your profession of interest, or your former lab partner who experienced a splendid internship may know of opportunities. Talk to others about your interests, your passions and your search—they are serendipitous sources of connections, empathetic ears, and perhaps the right advice you need at the moment.

6. Your lifetime career trajectory is not determined by initial conditions. It is usually easier to get into situations than to get out of them. Be that as it may, career decisions are rarely permanent. This decision feels big—it's not a small decision—but neither is it irrevocable. Recent studies indicate that college graduates will have, on average, four job changes by the time they are 32. This is twice the number of job changes made by graduates in the previous generation.⁵ Nor are changes open only to those early in their careers. For example, NASA Astronaut John Glenn was 53 when he became a US Senator! You are empowered to make one decision now and change your mind later—it's your life to live!

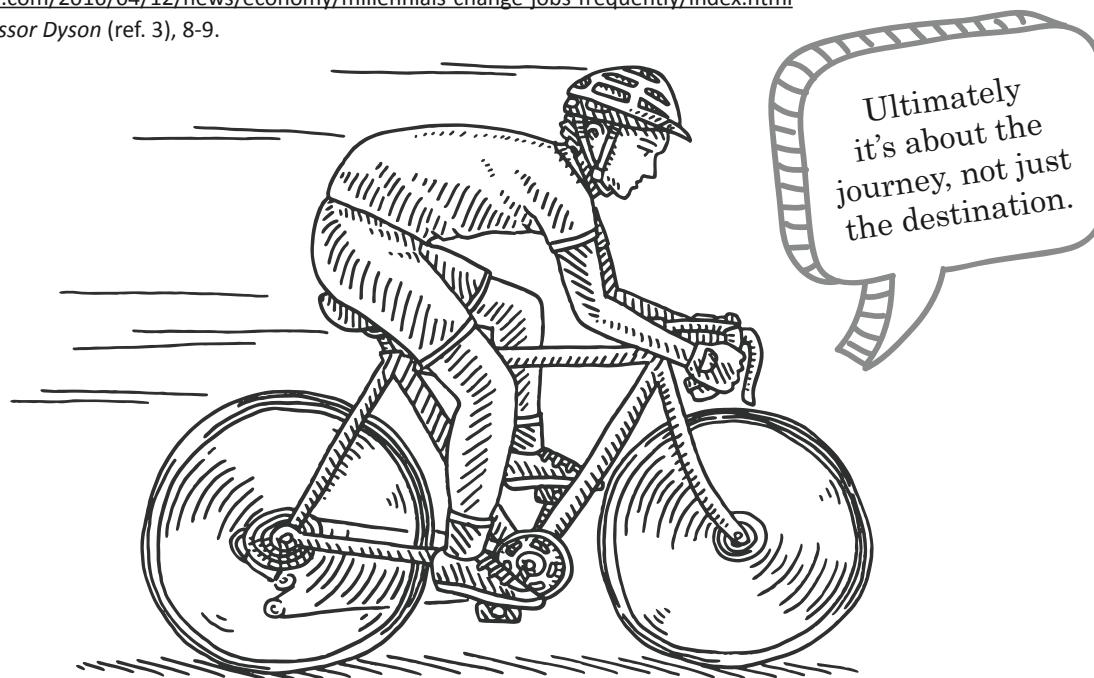
Upon reaching his 90th birthday, some of my students wrote to Freeman Dyson and asked him, "With the view from 90, what advice do you have for university students in their early 20s, which would help them live a life....with meaning and fulfillment?" Professor Dyson graciously replied,

"Thank you for your congratulations, but being ninety has not made me any wiser than I was before. My advice to you young people is still the same. Avoid making choices too soon, be ready to grab at unexpected chances when they appear, work hard at acquiring skills like programming computers or writing clear English that are always useful, make the best of whatever job you are doing, be ready to switch careers when necessary, be a good team player, and try to leave the world a better place than you found it. I like to repeat the advice that our daughter Esther puts on her e-mails: Always make new mistakes...."⁶

As you climb into that invisible Ferrari and race into the future, fear not—go after it with gusto and enjoy the journey. Ultimately it's about the journey, not just the destination.

5. money.cnn.com/2016/04/12/news/economy/millennials-change-jobs-frequently/index.html

6. *Dear Professor Dyson* (ref. 3), 8-9.



Making use of your professional network

A 2016 study by LinkedIn and the Adler Group found that 85% of all jobs are filled by networking. This is compelling evidence for making use of the networking tips in Tool #4 to find your future employment!

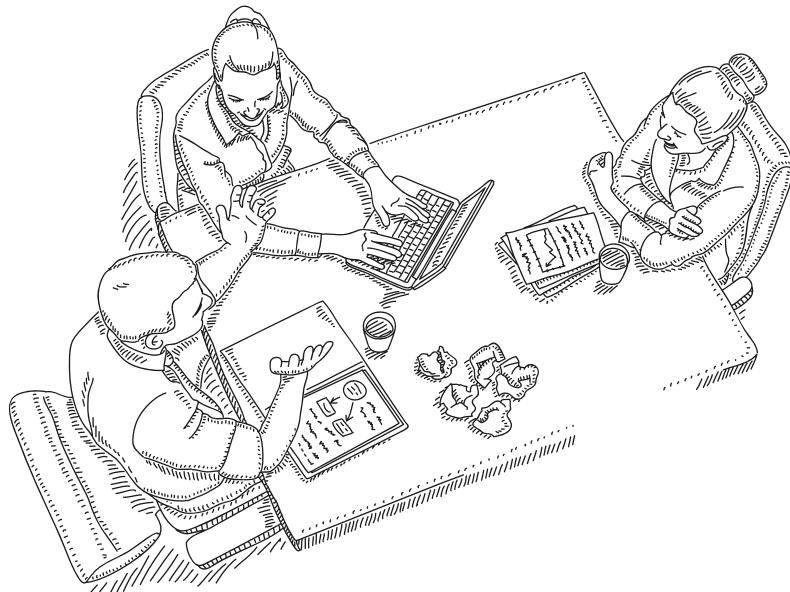
Your professional network includes faculty members, colleagues, family, friends, LinkedIn contacts, career professionals on campus, contacts from professional society meetings, and other people that you have encountered as part of your undergraduate experience. These connections are excellent resources when it comes to a job search.

The first step is to alert your network contacts that you are entering the job market. Do not be shy about sharing with everyone you meet that you are actively seeking a job. Most people are eager to help students by offering advice, leads, and sometimes even making introductions. When reaching out to professional contacts, be sure to remind them how you received their name or where you met. In many cases, it is best not to ask for a job directly, but to ask for advice or leads instead.

Working with your professional network

When networking, remember that getting a point of contact is just a beginning. To derive the most benefit, you'll want to stay in touch with your connections throughout your search. Here are some tips to remember when using your professional network to find a job:

1. When you reach out to someone, be sure to **remind them of how you met** or were referred their name. One way to help with this is to make a habit of taking notes on the back of exchanged business cards so that you can remember where you met, what you discussed and why you would follow up with this person in the future. Consider using an app to take pictures of cards to keep them organized or simply tape them into a notebook. The trick is to be able to find them easily later.
2. **Stay organized with your contacts.** Make a spreadsheet of your contacts with their name, title, organization, contact information, areas of expertise and a log of when you reached out to them in the past and when you need to take additional action. Treat this project like a formal research project, keeping careful notes about each contact.
3. **Stay on their radar.** A person you talk to only once will not be a strong part of your network. Send updates to your connections to let them know how school is going, where you are in your search, or to pass along information of interest. Cultivate the relationship.
4. **Curate your online presence.** Oftentimes, people in your network will look you up on social media to learn more about you. Be sure that any sites you belong to represent you in a positive light and you update your information frequently to highlight your recent accomplishments.



The online job search

Most important: Don't only search for "physics"! Physics students usually start their job search by entering the word "physics" when exploring large job databases. The results are usually disappointing. The word "physics" will not return nearly as many results as there are jobs available to physics bachelor's degree recipients, because most of these jobs do not have "physics" in the title. The common job titles held by recent physics bachelor's recipients (on page 11) **are a good place to start** when searching online job databases. Note that these job titles are intended as a guide; they are not exhaustive or exclusive.

Before you start, go back to the list of common job titles on page 11!

Is a teaching career for you?

Teaching can be a rewarding way to share your love of physics and astronomy while learning from students and the experience as well. Because a career in education is often not emphasized during physics undergraduate studies, it may be easy to overlook when considering a long-term career. But even without a teaching license or an education degree, it is easy to transition from physics into teaching!

Begin your search by looking at school district websites to see what types of jobs are available and what the requirements are for each position. Also reach out to anyone you may know who has contacts in these districts. License requirements vary by state, but all of the information you need about licensure can be found on each state's Department of Education website. Most public schools, some charter schools, and few private schools require licenses. Additionally, some schools prefer if you have degrees in the subject area that you want to teach! If a license is required and you do not have one, you need to apply for an alternative license through your state in addition to filling out applications. Alternative license candidates are often not primarily considered, but **having a contact who can put in a good word for you can go a long way**. Substitute teaching before applying for full-time teaching jobs is also a good way to gain experience, make contacts, and show educators that you are passionate and highly qualified to teach physics, math, and other related subjects.

Teaching can be an exceptionally rewarding profession that provides not only fiscal security but also an opportunity to give back to your community. It is a fantastic career option to explore if you have a strong passion for science and education. Many teachers also get long breaks in the summer/winter months.

Choose the right databases

There are many online job databases. While by no means an exhaustive list, the databases below are great options for physics students looking for STEM jobs. All of these sites have robust searching options, the option to upload a resume, and career advice. Most will also allow you to set up search agents which will email you automatically when jobs meeting your search criteria are posted.

Your college or university career center will also likely have a database of positions that you should investigate and visit frequently. This will be one of the best starting places to connect with employers who will recruit on your campus – allowing you to turn an online search into a real-world connection. Often, these employers will have already hired alumni from your school.

SPS Jobs | jobs.spsnational.org

SPS Jobs is part of the American Institute of Physics Career Network and has bachelor-level positions appropriate for physics applicants, as well as jobs for physics graduates at other levels.

USAJobs | www.usajobs.gov

USAJobs is the US federal government's official job list. There is a special portal for students and recent graduates to find internships and jobs. Jobs at NASA, NIST (the National Institute for Standards and Technology), the NRC (Nuclear Regulatory Commission) and other federal agencies are posted on USAJobs.

Tool #6: The Job Search Strategy

Science Careers | jobs.sciencecareers.org

Science Careers, the careers component of the journal *Science*, is a database of job postings from around the world for scientists of all disciplines, backgrounds, and experience levels. Although many of the positions are for PhD scientists, there are some that require only a bachelor's degree.

Engineer Jobs | www.engineerjobs.com

Engineer Jobs is an extensive database of engineering job opportunities of all types within the United States and Canada.

The Institute of Electrical and Electronics Engineers (IEEE) job site | careers.ieee.org

This is another useful job database for engineering positions. There is a related portal for students looking for entry-level jobs at www.aftercollege.com/organizations/ieee-entry-level-jobs/.

Glass Door | www.glassdoor.com

Glass Door aggregates jobs from the web, but also allows job seekers to see reviews from current and former employees as well as salary data. These insights can be helpful as you investigate workplace culture.

LinkedIn | students.linkedin.com

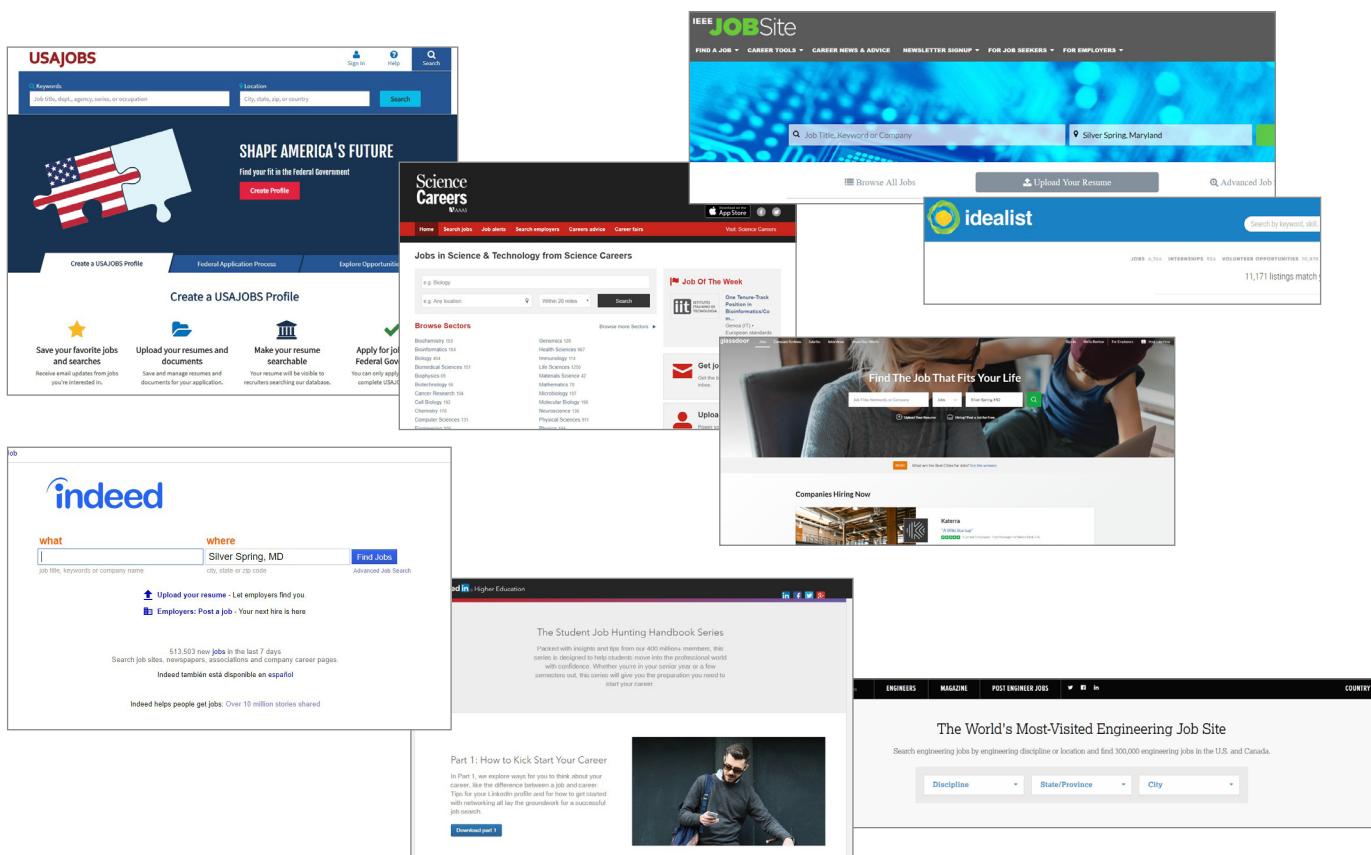
In addition to being a hub for networking, LinkedIn also allows employers to post jobs. This particular portal will guide you toward positions oriented to students.

Indeed | www.indeed.com

Indeed is a large single-topic search engine that aggregates job listings from thousands of websites.

Idealist | idealst.org

Idealist is an online meeting place for nonprofit organizations, resources, consultants and volunteers. Many opportunities for STEM outreach and education positions are posted here.



The job fair

A job fair is a gathering of several employers in a central location who are there to meet with potential applicants. Job fairs can be themed around certain employment sectors (e.g., healthcare) or may be broadly based. Many schools host job fairs, but you can also find them at other community locations. The challenge for physics students attending job fairs is to know how to talk about your skills in a way that is meaningful to potential employers (Tool #5). The representatives of an engineering firm at a job fair may not know that physics students commonly go into engineering positions with great success, so it is up to you to demonstrate with an appropriate resume (Tool #7) that you are a great candidate and to be able to articulate clearly why you are well suited for the prospective position. Even before you are ready to begin applying, it is a great idea to explore some job fairs to learn about what kinds of positions are available and what types of skills those employers are looking for.

Timeline for Job Fair

c — Two weeks out:

Do research in advance on the organizations who will be attending and have a game plan for those you want to visit. You probably won't be able to stop by every table so pick 6-8 that are on your "Must See" list and then another group that you would be interested in but are not in your top tier.

Prepare resumes for specific companies you want to visit. Update those resumes and have your career center or others that you trust review it. Remember, that the "one size fits all" resume is not effective. Based on your assessment of employers in attendance, you may want to tailor your resume to match your knowledge and skills to what each of your selected "Must See" organizations are looking for.

c — One week out:

Get your professional outfit cleaned and ironed. Consider getting a haircut and polishing your shoes.

Practice your elevator speech (Tool #4).

c — Day before:

Print out copies of your resume and organize them in a portfolio, along with a pen, and your business cards. You will probably pick up flyers, brochures, and business cards at the fair. A portfolio is a great way to organize them.

c — At the fair:

Visit the organizations you planned on, but also keep an eye out for new organizations. If a company has a display that catches your eye, stop and talk to them about it. You may be surprised at the opportunities you find!

Get contact information from everyone you talk to. Business cards are great for this. Remember to write notes on the back of the card to help you remember the specifics about your interaction.

Talk to your fellow job seekers. They may be able to help steer you toward an organization you were unaware of before.

c — Within 2 business days after:

Follow up with anyone you spoke to at the fair. Send a short email thanking them for their time and following up with any additional information they requested. You could consider attaching a cover letter and revised resume that are tailored to the specifications you discussed at the fair. Also consider connecting with recruiters that you met on LinkedIn.

An example experience: The job fair

The following article was written by Shouvik Bhattacharya, an SPS summer intern who worked on the Career Pathways Project. Attending a job fair can be an eye-opening experience and give you lots of opportunities to practice your elevator speech (Tool #4), talk about your knowledge and skills, and communicate why someone with a physics degree is qualified for many different kinds of jobs. In addition, the list of common job titles may help you communicate effectively with job fair exhibitors unfamiliar with the kinds of jobs that are often done by individuals with a bachelor's degree in physics.

My First Visit to a Job Fair

by Shouvik K. Bhattacharya



I take a deep breath and step inside the fair pavilion at the Ronald Reagan Building in Washington, DC. There are about thirty small booths occupied by prospective employers at this summer career expo sponsored by the magazine *Equal Opportunity*, and already four of them are crowded. The University of Virginia booth looks less crowded, so I decide to visit there first.

A woman welcomes me with a warm smile and gives me a pen with the university's name printed on it. She says that the human resources department recruits applicants from diverse academic backgrounds, including physics. An applicant with a STEM (science, technology, engineering, and mathematics) background is expected to have the qualities of coordination and collaboration. These are valuable skills that employers care about. She shares her contact information and also requests my resume in turn.

I wander off for a bit and then enter the US Bureau of Labor Statistics booth. I expect that someone who completes a bachelor's degree in physics is likely to have taken some statistics courses, and that is what motivates me to stop by this particular booth. But the representative informs me that a physics major should apply only if he or she has a strong mathematics and statistics background.

The next representative I speak with, at the Boeing Corporation's booth, sounds very positive and enthusiastic. She tells me that the company has many entry-level openings. She advises me to create a profile on Boeing's career website and to prepare a resume based on the jobs that are available. She emphasizes that being flexible about relocation and having a positive attitude toward learning new things are essential to an employee's job security. I realize that all representatives at the job fair are actually there to help applicants, and I feel confident thereafter.

Then I stop by the job booth of the US Nuclear Regulatory Commission, where I am handed a job list. This government agency definitely hires physics undergraduates. The representative asks me to share this information with anyone who would be interested in applying for the entry-level openings. Job titles included general engineer and scientist, both of which require a minimum cumulative GPA of 2.8 overall and 3.4 in the applicant's major. The job descriptions include writing, critical thinking, decision making, inspection, and conformity research as the integral duties that employees would have to perform in this job. I get a little excited seeing all these details. So far this has to be my best experience of the job fair, as I get to see an example of how a physics major can start working after a successful degree completion.

The US Air Force posts their jobs through the USAJobs website, which I learned at its booth. The representative at the IRS booth tells me that living in a big city can seem tough and challenging, but ultimately it turns out to be beneficial, as dynamic city life motivates employees to perform better. He also tells me that it never hurts to be ambitious. A representative from the Defense Intelligence Agency asks me why I have not highlighted in my resume the electronics courses that I had taken. The resume I had handed him focuses on my research background in observational astronomy. I realize that having a few different versions of my resume would be beneficial.

In the beginning, I felt a little overwhelmed, but I soon realized that all of the representatives are there to help and answer questions. Looking back at it now, I know what I have to do when I attend my next job fair. The role I played at this fair might be considered that of a surveyor, rather than that of a potential job seeker. I didn't prepare different versions of my resume, highlighting different skill sets. That is the first thing one should do before attending a fair, as the resume serves the role of a conversation starter. Wearing business clothes is also a must, because it shows how interested and serious one is about finding a job. I made a few new connections at the job fair, and I've now sent follow-up emails to each, conveying my thanks for spending their valuable time with me. The job fair visit was an absolutely amazing learning experience for me.

How do you know when you have a good match?

By reaching out to your contacts, effectively searching online databases, and visiting local job fairs you can hear about a wide variety of job opportunities. But how do you know when you have found a good match?

Zero in on matching your qualifications with the requirements of the position. In many cases, you do not need to meet all of the qualifications for a position as long as you present a strong case in your cover letter and resume. For example:

- If a qualification is “two years of relevant job experience” and you are a new graduate, you may still be considered if you highlight in your cover letter and resume the relevant experience you have gained while in school through class projects, internships and student organizations.
- If a job qualification lists “engineering degree” and you have a physics degree, you may still be considered if your cover letter and resume highlight how well your physics degree prepared you for an engineering position.

Sometimes **qualifications** may be non-negotiable or there may be several that you do not meet. If you are not sure whether you qualify, contact the company and ask before you invest too much time in preparing your application.

Look for **key words**. As you read through a job ad, look for key words that explain what the company is looking for and the responsibilities of the position. Write these down as you go. After reviewing the description, assess how well the key words match up with your skills, abilities, and interests. Keywords need to be on your resume too!

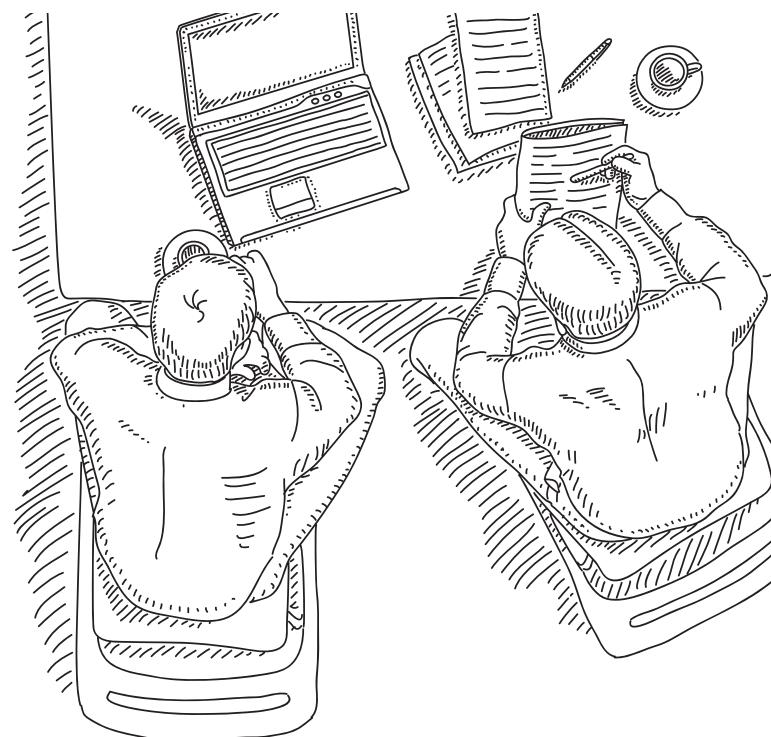
Explore the company through online searches and see whether their mission and reputation align with your interests and ambitions. Try to find out about company culture from current or past employees. This may be a great opportunity to revisit the informational interview (Tool #2).

Other factors to consider:

- How long has the position been listed? If it has been listed for several weeks, it may be worth contacting the company first to see whether the position is still open.
- Is the salary and location acceptable to you?
- Carefully reviewing job ads that interest you will enable you to be more efficient with your job search. Discarding jobs that do not seem like a good fit will enable you to focus your attention on crafting thoughtful, targeted resumes and cover letters for jobs that are worth exploring.

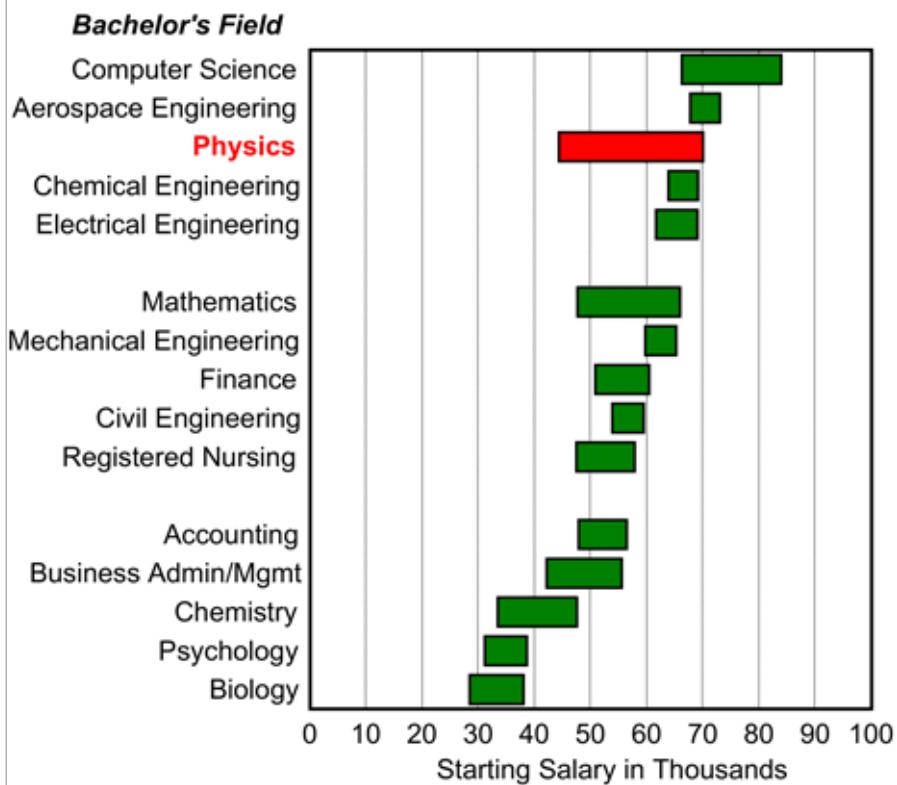
What is a physics bachelor's degree worth?

As shown in Figure 5, new physics bachelors earn some of the highest starting salaries of any undergraduate major. There is some variation, depending upon the specific type of employment (see Figure 6), however, positions in the private sector tend to pay the most. When considering salary, be sure to consider factors like the cost of living for the area where the job is located and other benefits such as retirement, flexible work schedules, health insurance and transportation allowances. Understanding your value as well as the full compensation package will put you in a much stronger position for negotiation.



What's a Bachelor's Degree Worth?

Typical Salaries for Bachelor's Degree Recipients, Class of 2015



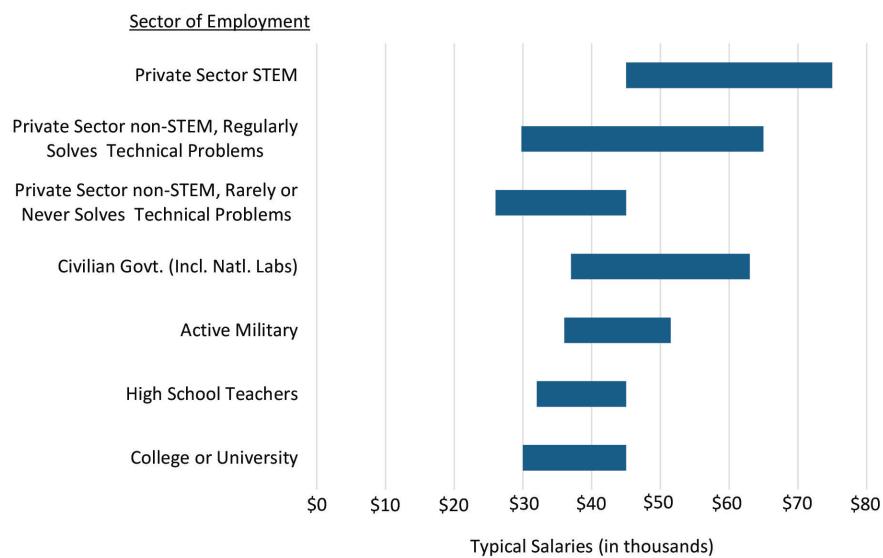
Physics jobs have a large variation in salary because of the large variety of jobs physicists occupy.

Figure 5. Typical Salaries for Bachelor's Degree Recipients.

Note: Typical salaries are the middle 50%, i.e. between the 25th and the 75th percentiles.

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Typical Starting Salaries for New Physics Bachelors, Classes of 2015 & 2016 Combined



Private sector job tend to pay more upfront but other jobs, such as teaching, have other benefits.

Figure 6. Typical Starting Salaries for New Physics Bachelors

Figure includes only bachelors in full-time, newly accepted positions. Typical salaries are in the middle 50% i.e., between the 25th and 75th percentiles. STEM refers to positions in natural science, technology, engineering and math. Regularly solving technical problems refers to respondents who selected "Daily", "Weekly", or "Monthly" on a four-point scale that also included "Rarely or Never" when asked how frequently they solved technical problems in their positions.

Exercise - Tool #6: The Job Search Strategy

⇒ Carry over the job titles you are most interested in from page 14.

Job titles I am interested in learning more about:

- ⇒ Choose a few online job databases from pages 43-44 and search for those job titles. Print a few positions that sound interesting to you.
- ⇒ Choose one of the positions and use it to complete the boxes below.
- ⇒ Ask yourself, “Is this job worth pursuing?”
- ⇒ Ask yourself, “If I get an interview, would I be interested in going?”
- ⇒ Repeat for additional job advertisements. (You will need more copies of this page.)

Position title:

Key words or phrases describing what the company is looking for in a candidate	How well does this match my skills and abilities?	Key words or phrases describing the responsibilities of the position	How well does this match my skills and abilities?
Qualifications listed in the job description	How well do I meet these qualifications?	Notes about the company mission, reputation, salary, location	How well does this align with my interests and ambitions?

⇒ Track your applications using a spreadsheet like the one below

Organization	Address	Contact Name	Phone	Email	Type of Contact	Date of Contact	Action Needed	Action Deadline
ABC Corp.	314 Main St.	Albert E.	##	@	Met at job fair	10/8	Apply online	10/25
XYZ Tech	674 Tech Rd.	Marie C.	##	@	Left voicemail	10/10	Follow up in 2 weeks	10/24

Keep detailed notes. You won't remember many details in a few weeks and deadlines have a tendency to slip away without a plan and dates.

Getting to Work – Tool #7: Putting You on Paper—The Resume

A resume is a summary of your qualifications for employment. It may be the only information a potential employer has to determine whether or not you will be interviewed, so it is important to make sure that yours stands out.

Resumes can be challenging to write, but there is good news! If you have already gone through the “**Identifying Your Skills**” exercise (on page 36), you have done much of the hard work of writing an effective resume. Now your task is to match *your* skills and experiences with those highlighted in the description of the job to which you are applying. These are the skills and experiences that you should highlight in your resume. After this, all that remains is to add your work experience and education, and decide on an order and layout.

The difference between a resume and a curriculum vitae

Having a resume for work or research positions as an undergraduate is important. The resume, which is intended to articulate concisely your knowledge and skills as they apply to a particular position, is very different from the experience record that is typically used for academic positions (such as post doctoral positions, etc.). This longer account of an individual’s experience is called a *curriculum vitae*, or “CV”. Students who intend to pursue a career in academia should consider beginning to develop a curriculum vitae even as an undergraduate. This is in addition to a resume. Even for undergraduates, the differences between the resume and the CV are in length, content, and level of included detail.

The CV is a cumulative list of an individual’s accomplishments, achievements, and experiences. Thus, the length of the CV grows over time and serves as one’s permanent record for an academic career. For those early in their academic careers, the CV may be a few pages. For more experienced academics, the CV may be quite lengthy. For contrast, the resume is generally one, or *sometimes* two pages, but rarely so for undergraduates.

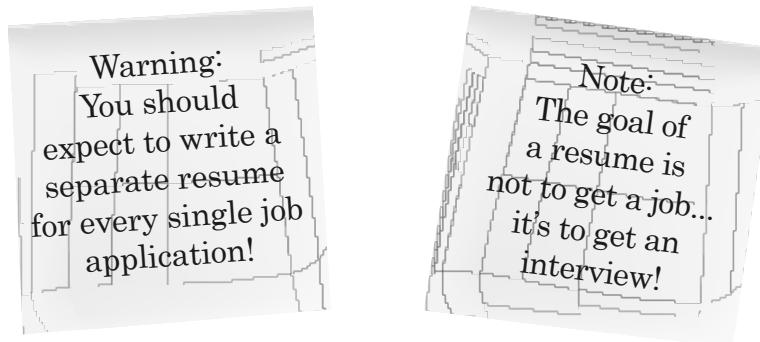
The CV generally includes details of record at a level that are not necessary (or desired) for a resume. Details about research, teaching, publications, and honors are always chronologically recorded on a CV. The goal is to provide sufficient detail so that the career of the individual is clearly codified. This differs from the resume, which must be designed for a specific job application, highlighting only those experiences that are relevant to the particular position.

Lastly, the CV changes only by the addition of experiences, achievements and accomplishments. In that sense, the CV is always growing and represents a detailed list of career milestones. In contrast, the resume usually stays the same length and changes with each job application, focusing on the knowledge and skills relevant to the position.

Undergraduate students are wise to develop a working set of bullet points for a resume, even if the goal is to pursue an academic career. Often, when applying for summer research or internships, it is crucial to be able to clearly and concisely articulate your knowledge and skills as they are relevant to the specific position, much like applying for a work position.

Being in command of your own set of knowledge and skills is important as you develop professionally, independent of your career goals! **It is advised that all students keep a CV, if only to record everything that you have done and to be able to keep it well organized.** Often, professionals will consult a CV when crafting resumes for specific positions.

Common sections for a CV: Education, Professional Experience, Awards and Honors, Publications, Leadership Positions, Professional Service, Society Affiliations, Conferences, Mentees, Grants and Proposals, Presentations (Talks and Posters), Teaching Responsibilities, Certifications, and Special Projects.



Resume essentials

Resumes have several components, but the most important one for you to focus on as a physics student is the detailed list of **education, experience, achievements and skills relevant to the specific job** for which you are applying.

Again, you should expect to write a separate resume for every single job application!

This sometimes comes as a surprise to job seekers, but it is one of the keys to an effective job search.

So what goes into a resume? There are two primary considerations when presenting information in a resume—make it **chronological and skills-based**. Both components are critical to convincing employers that you are the right person for the job.

Chronological: Most traditional resumes focus on the chronological order of your experiences. They typically use headings such as Education, Experience, and Skills to organize different types of information and the specific entries are ordered in reverse chronological fashion. Make your resume roughly chronological, as seen in the three examples that follow. More recent experiences need to go closer to the top within each heading, and experiences should be listed succinctly. By listing your experiences in this common format, your resume will look very familiar to recruiters.

Skills-Based: Since physics majors work in so many different areas and job sectors, we often need to specifically highlight the skills that a physics major brings to the table. Your goal is to show beyond a shadow of doubt that you are qualified for the position you are applying for by listing specific examples of qualification, skills, projects, and examples under your succinctly listed experiences. This process of adding bullet points summarizing specific qualifications after the name and date of the position is called **skills-based** context. This format is very helpful for someone who has broad skills and is seeking employment in a specific field. Physicists are problem solvers and, by highlighting specific examples, projects, and skills, you can *show* that you are qualified (instead of merely stating that you are qualified).

As an example, if you were applying to a semiconductor company but you had experience building and maintaining vacuum equipment, that would be a fantastic thing to list as a bullet. So would developing the automation sequence for the telescope you worked on at the observatory. The key is to be specific and to the point.

As a physics major applying to a position without the word physics in it, you need to make sure you display and explain your skills clearly to those looking at your resume.

Clearly detailing your relevant knowledge and skills may be the single most important part of your resume. For physics students, this can be challenging.

Notes on resume style and length

Before we start, remember:

- No two resumes are the same.
- No two resume writing guides are the same.
- Experts have different opinions about resumes, and employers do too.

The main questions you should ask yourself related to the organization of your resume are:

1. Is it effectively telling my story?
2. Is it an accurate portrayal of me and my experiences?
3. Is the visual layout easy to read, and does the layout reflect the relative importance of different components?

Take advantage of your network in getting feedback and insight on your resume. Your school's career services professionals are great people to start with to get tips on content, formatting, and style. See the samples on page 58-60 for other ideas.

Most recruiters agree that a resume for a student or recent graduate should be only one page long. If you have had multiple internships, research projects, or other work-related experiences, then your resume could be longer. However, most employers will not even glance at the second page if you have not caught their attention with the first one, so instead of focusing on the length, focus on including content that is **relevant, accurate, and presented well**.

Suggested sections on the resume

Educational background

For most students, your education is the most relevant qualification you will have for an entry-level position. It is also typically the section that most recruiters will look for first.

Start with your bachelor's degree with your completion or expected graduation date. Use a reverse chronological order: start

with the most recent date and work your way back. Include double majors or minors. You may include honors and awards (Cum Laude and Sigma Pi Sigma membership), and scholarships received, with very brief explanations of honors and awards since the reader may not be aware of what they are. You may include community college or study abroad experiences here, but high school diplomas should not be included past your first year of postsecondary school.

Many recruiters will look for a GPA. If your GPA is above 3.0, you should definitely consider including it because it demonstrates your academic ability. If the employer asks for GPA in the job posting, be sure to include it. If you do include a GPA, indicate whether it is a cumulative (total) GPA or a major GPA (demonstrating aptitude in physics and math). Inclusion of GPA is tricky, since course rigor and grading mean different things at different schools and your employer may not be familiar with your university.

Knowledge and Skills

Explaining your skills and listing everything that is pertinent to a particular job posting is vital in the digital application age. Many companies search documents for key words (that often appear in a job posting) as a starting point of narrowing down a search. As an example if the job requires Python coding experience and it's not listed on your resume, your resume might not get looked at to begin with.

If you have done a careful assessment of your unique set of knowledge and skills (Tool #5), building this section of your resume becomes much easier. However, the most important part is to carefully compare your list of skills and abilities to those mentioned in the job description. Then, select from your set of skills those that overlap with the job advertisement. On your resume for *that particular job*, you should **list the skills that appear to be most important to the employer first**. This list of skills should be directly tied to the information in the job advertisement. You should also highlight these briefly in your cover letter (Tool #8).

New graduates often include a brief “Relevant Coursework” section on their resume as a way to demonstrate knowledge or familiarity with concepts highlighted in the job description. If you choose to do this, be sure to list descriptive course titles (e.g., “Statistical Methods for Physics”) not course numbers (e.g., PHYS352). It’s not advisable to put every related course (University Physics I, Calculus I) but it can help if you want to display your training. In general, if that course would directly help you with the job, consider listing it. You may also consider adding any technical and online training courses you have completed under qualifications. This might include certifications in software, safety, or other relevant areas.

Experiences

Include any related experiences (jobs, internships, research, class/personal projects, student leadership, community service), ordering them in reverse chronological order and using sections headers to move more relevant experiences higher on the page. Each work experience should be accompanied by bullet points that use action words (see page 55) and highlight specific accomplishments or tasks. Whenever possible, choose accomplishments or tasks that align with the description of the position you are applying for and quantify the impact you have had through this experience. Jobs that may at first appear unrelated may be excellent examples of your leadership or problem-solving experience, so spend some time writing thoughtful descriptions of your experiences that offer readers insight into your skills. In fact, highlighting your transferable skills is one of the easiest ways to demonstrate to employers that you have what they seek in a candidate. When explaining these skills, use action-oriented statements (note that the first word in the phrase is an action word).

Example action-oriented statements:

- **Designed and constructed a prototype drone to collect atmospheric data at multiple locations across campus**
- **Developed code in Python to reduce data processing time by 30%**
- **Authored and maintained the Society of Physics Students webpage and listserv; efforts resulted in a 25% increase in member participation at events**
- **Led weekly science outreach efforts for middle school students and mentored them in applying for selective STEM educational programs**
- **Demonstrated excellent customer service in taking and fulfilling orders. Recognized as employee of the month twice in 2016**



Remember—it is better to show something than to state something. As an example, instead of saying you are proficient in Python and electronics, briefly explain the amazing project you led that used both skills.

Other information

You may want to include other information on your resume that provides evidence of your relevant skills, interests, or accomplishments. This may include affiliations with organizations and societies, extracurricular activities, especially if you had a leadership position (e.g., captain of the tennis team), and awards or honors.

Individualize your resume to the job

You will increase your chances of receiving an interview if you take the time to make your resume specific to each position for which you are applying. When you apply to a new position, take out your skills list and modify an existing resume to better match that specific job ad. Make it easy for a potential employer to see why you are right for *this* job by highlighting your skills and experience most relevant to those listed in the description first and in the most detail.

A word about describing your abilities

Writing a resume is about selling yourself, but it is important to be honest about your abilities. For example, when writing about computer software, many students use the term proficient when their skill level is merely adequate or less, i.e., they got a C in a programming course. While inflating your ability may help you get an interview, it could lead to real trouble on the job. In addition, candidates may be asked to demonstrate their skills in software or other areas through content-related questions or proficiency tests. It can be tricky to choose the appropriate word to describe your skill level because many of these types of words are inherently vague. The better course is to describe your experience. Consider how “Developed LabVIEW code daily to take materials characterization data for 10-week research project” is more descriptive than “Completed two semesters of C++. Tell a story.

A word about asking for references or recommendations

You do not need to include personal or professional references on a resume, but often an employment application requires a list of references. Sometimes there is a request for a letter of recommendation. Before you list anyone as a reference, ask permission. It is also important to provide all of your references with a copy of your resume, specifically for the job to which you are applying, and a copy of the job description. If you need the recommender to do something other than wait for a phone call, provide specific written instructions. Do not make the mistake of making an informal request without providing details about what you want, when you need it, and where it should be sent. It is a good idea to provide an addressed, stamped envelope if you are requesting a letter that needs to be sent via regular mail. It is also your responsibility to follow up with the recommender.

A word about federal government resumes

Many physics students may seek opportunities to work in a national lab or other federal facility. If you are applying to a federal position, keep in mind that resumes for these jobs often require very specific information and details beyond what will be in your standard resume. Use the resume builder tool on USAjobs.gov to ensure that you are providing all the right details in the proper formats. There is a lot of competition for federal jobs and not following the rules is an easy way to have your resume disregarded.

Career trajectory - Other options

Upon graduation, not all physics majors go straight into the work force. Many choose to continue their education. Historically, as seen in the Figure 7, while approximately one in three with a physics bachelor degree will go on in their studies of physics or astronomy and about one in five go on to study in another field. Of this group that continue their education, engineering is most common with many others following, as seen in Figure 8.

By identifying your career goals early on, you can research the educational backgrounds of people in that field and make an informed choice about whether graduate school is right for you. Many students choose to focus their graduate studies in a different field from their bachelor's degree because of a desire to focus on a specific career trajectory or position. As an example, some students who enjoy electrodynamics and want to specialize in this branch of physics will go on to study Electrical Engineering. Physics degrees are a fantastic basis on which to develop a more specialized career.



About 1 in 5 physics bachelor degree recipients go on to study other fields in graduate school.

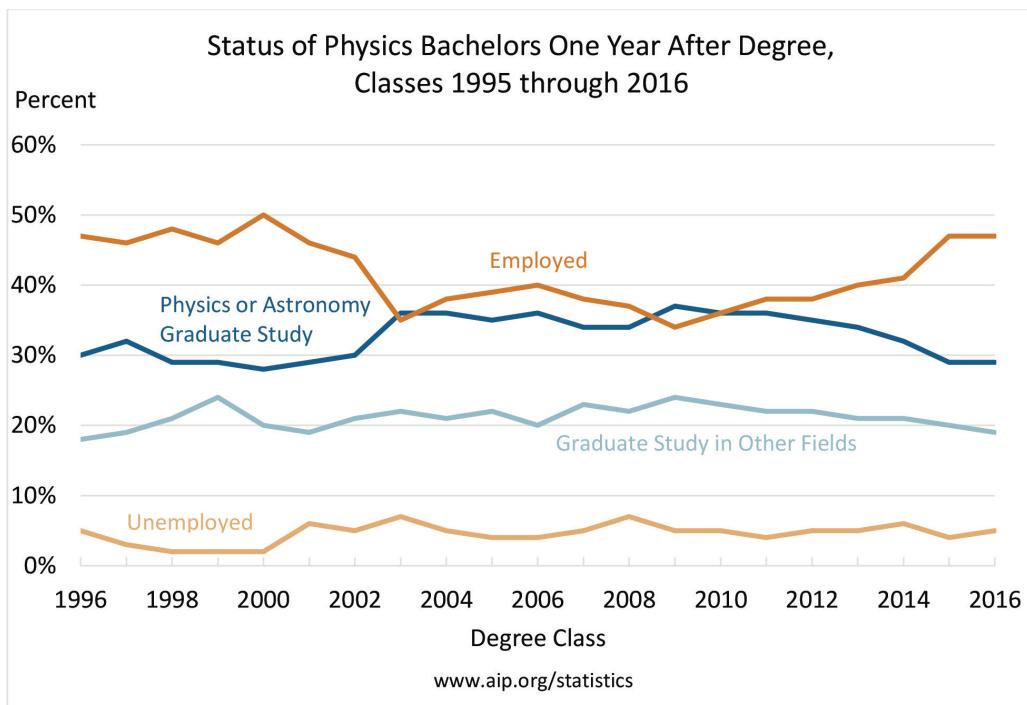


Figure 7. Historic Trends in initial outcomes for Physics Bachelors.

Note that while graduate study in other fields and physics or astronomy graduate study are common, employment is the most likely initial status.

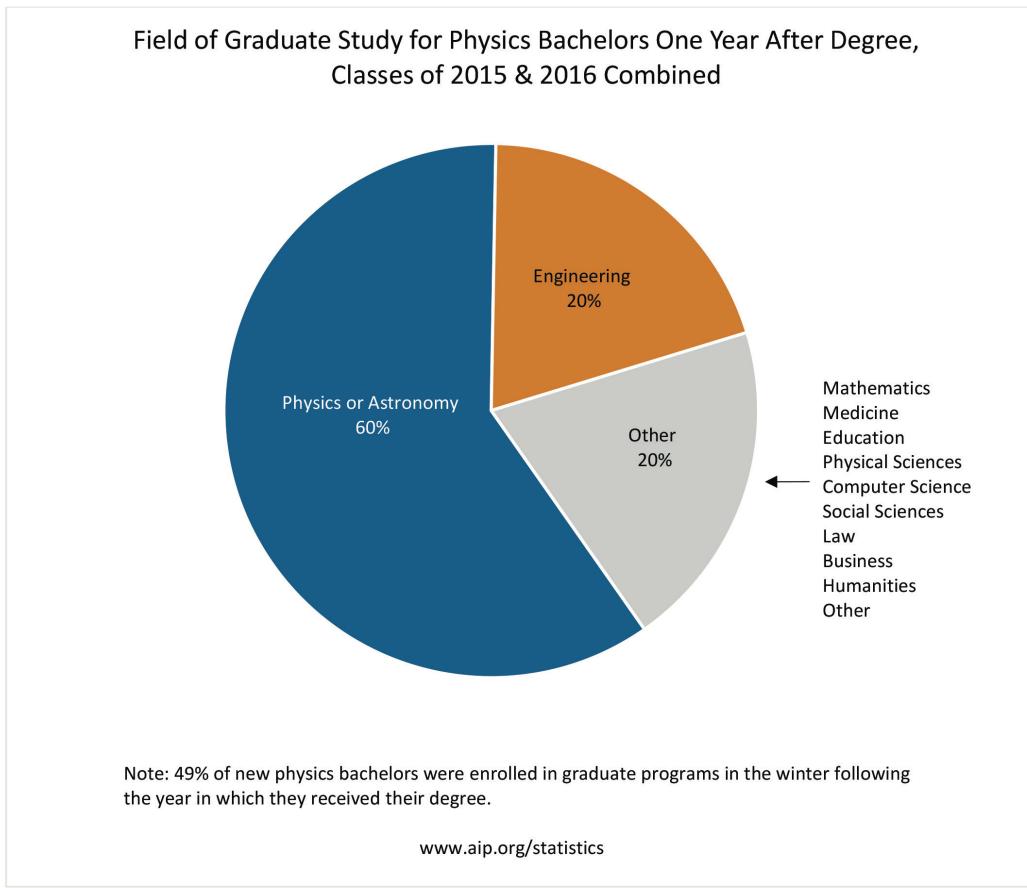


Figure 8. Physics Bachelors go on to pursue a range of graduate degrees.

While physics and astronomy are the most common fields of graduate study, 4 out of 10 students choose other fields.

An Action verb list for developing resume bullet points

MANAGEMENT

administered	chaired	delegated	executed	oversaw	recommended	supervised
analyzed	consolidated'	developed	improved	planned	reviewed	
assigned	contracted	directed	increased	prioritized	scheduled	
attained	coordinated	evaluated	organized	produced	strengthened	

COMMUNICATION

addressed	collaborated	directed	formulated	mediated	promoted	spoke
arbitrated	convinced	drafted	influenced	moderated	publicized	translated
arranged	corresponded	edited	interpreted	negotiated	reconciled	wrote
authored	developed	enlisted	lectured	persuaded	recruited	

RESEARCH

clarified	diagnosed	extracted	interpreted	organized	surveyed
collected	evaluated	identified	interviewed	reviewed	systematized
critiqued	examined	inspected	investigated	summarized	

TECHNICAL

assembled	computed	engineered	operated	remodeled	upgraded
built	designed	fabricated	overhauled	repaired	
calculated	devised	maintained	programmed	solved	

TEACHING

adapted	coached	demystified	encouraged	facilitated	instructed	goals
advised	communicated	developed	evaluated	guided	persuaded	stimulated
clarified	coordinated	enabled	explained	informed	set	trained

FINANCIAL

acted	customized	directed	founded	instituted	invented	planned
conceptualized	designed	established	illustrated	integrated	originated	revitalized
created	developed	fashioned	initiated	introduced	performed	shaped

HELPING

assessed	coached	diagnosed	facilitated	motivated	represented
assisted	counseled	educated	familiarized	referred	
clarified	demonstrated	expedited	guided	rehabilitated	

CLERICAL OR DETAIL-ORIENTED

approved	collected	generated	operated	purchased	specified
arranged	compiled	implemented	organized	recorded	systematized
catalogued	dispatched	inspected	prepared	retrieved	tabulated
classified	executed	monitored	processed	screened	validated

MORE VERBS FOR ACCOMPLISHMENTS

achieved	improved	reduced (losses)	resolved (problems)	restored	transformed
expanded	pioneered			spearheaded	

Exercise - Tool #7: Building the “Knowledge and Skills” Section of Your Resume

This exercise should be completed for each job! Carry over a position description and the relevant key words from Exercise #6. Choose a position that aligns well with your skills, abilities, and interests and complete the first two columns below. These bullet points will go either under your experiences or in your skills section.

Key words or phrases describing what the company is looking for in a candidate (Exercise #6)	Related bullet points (Exercise #5) - If you don't have one for this key word or phrase, create one following the Exercise #5 guidelines.	Priority

Key words or phrases describing the responsibilities of the position (Exercise #6)	Related bullet points (from Exercise #5) - If you don't have one for this key word or phrase, create one following the Exercise #5 guidelines.	Priority

⇒ Go back to the job description and identify which key word or phrase seems to be most important to the company. Put a “1” in the priority column next to this key word. Repeat this until you have prioritized the entire list. (Note that you should have one running priority list that includes the key words and phrases in both sections—do not restart at “1” in the second section.) Skip any key word or phrase for which you do not have a good bullet point.



Tip: To identify the keywords for a job, highlight the top 10 things listed in the ad.

⇒ In the boxes below, rewrite your top 5–8 list of “Tell it” bullet points in order of priority.

My related “Tell it” bullet points in order of priority

The bullet points for your resume are now done for this position! If you were applying to multiple positions, you would repeat this exercise for each position to create a version of your resume specific to each job. The hard work of writing the bullet points in Exercise #6 sets you up to easily create different resumes targeted for each position that interests you.

Caroline Quark

1234 Neutron Dr. Apt 314, Sacramento, CA 98436
(990) 555-4567 caroline.quark@gmail.com

Education

California State University, Sacramento (CSU-Sacramento)

Sacramento, CA

BS in Physics, Minor: Computer Science

Expected Graduation: May 2019

Cumulative GPA: 3.68 Major GPA: 3.86

Skills

Programming: Python (experienced), Java (proficient), C (proficient), C++ (limited)

Software: Microsoft Office, LabVIEW, gnuplot, Verilog

Hardware: Advanced electronics, analog and digital device design, machining tools

Analysis: Electronic noise, Electromagnetic field simulation of devices

Languages: Conversational Spanish

Professional Experience

Logic Design Intern

May – August 2017

Intel Corporation

San Jose, CA

- Designed and implemented high speed memory interface IPs for low power applications
- Validated designs using standard test protocols
- Reduced error rates by 20% between test phases
- Developed advanced abilities in debugging using Verilog simulation tools

Undergraduate Research Assistant

June 2016 - Present

CSU-Sacramento, Dept. of Physics & Astronomy, Advisor: Dr. Isaac Newton

Sacramento, CA

- Built a temperature controller using a Programmable System on a Chip (PSoC)
- Programmed a PID controller system using C with a wide range of inputs
- Conducted extensive literature reviews and a patent search on comparable devices
- Strong familiarity with electronics, analog/digital electronic devices, and machining tools

Leadership

President, Society of Physics Students, CSU-Sacramento Chapter

August 2016 – May 2017

- Conducted 12 science outreach events for local elementary and high schools
- Organized 20 students to attend 2016 Physics Congress (PhysCon) in San Francisco, CA

Resident Advisor, CSU-Sacramento

August 2016 – Present

- Mentored and counseled 45 first-year students
- Developed programming covering conflict resolution, sustainability, and study habits

Awards and Honors

Sigma Pi Sigma Physics Honor Society

May 2017 – Present

Maxwell Physics Scholarship

August 2015 – Present

Presentations (Poster unless noted)

Low-temperature PID characterization of LaB6 crystals

November 2016

2016 Physics Congress (PhysCon), San Francisco, CA

Characterization of LaB6 devices in UHV

August 2016

CA Space Grant Symposium, San Francisco, CA

Gabe Gravity

876 Main St., Memphis, TN 45832 | (555) 555-5555 | gabe.gravity@gmail.com

Education

Rhodes College, Memphis, TN

- B.A. in Physics
- Minor: Technical Writing

Expected December 2018

GPA: 3.3

Skills & Abilities

Technical

- Advanced ability to format and present documents in Microsoft Office, LaTeX, and Adobe InDesign
- Basic coding and modeling in IDL and Python

Communication

- Able to write clearly and concisely for a range of technical and non-technical audiences
- Synthesize quickly and communicate technical knowledge to a diverse group
- Presenting technical information through 2 posters and an oral presentation at scientific conferences

Leadership

- Manage volunteer recruitment and organization for multiple on- and off-campus public outreach events
- Mentored 2 reporters to become productive members of the Rhodes Weekly News team

Experience

LEARNING ASSISTANT

Rhodes College, Department of Mathematics

January 2016 – Present
Memphis, TN

- Tutor first- and second-year physics students in Calculus I -III and matrix algebra
- Recognized as Learning Assistant of the Year for 2016-2017 academic year.

OUTREACH CHAIR

Society of Physics Students, Rhodes College Chapter

August 2015 – May 2016
Memphis, TN

- Annually coordinated and led 10 on- and off-campus public outreach events for K-6 classrooms
- Developed age-appropriate demonstrations of physics and astronomy phenomena
- Facilitated outreach several events with the Pink Palace Museum and St. Jude Target House

Extracurricular Activities

Society of Physics Students

August 2015 – Present
January 2016 – Present

Science Writer, Rhodes College Weekly News

Select Presentations

Outreach to the stars – Science for kids

SESAPS Annual meeting 2016

April 2016
Memphis, TN

Newton's Third Law Experiments for K – 6

SESAPS Annual meeting 2015

October 2015
Bowling Green, KY

Ella M. Particle

1000 Massachusetts Ave., NW, Apt. 101, Washington, DC 20040
555-555-5555 | ellap@american.edu

Skills

Technical Experience

- Developed testbeds and automated device characterization for organic transistors including hardware, software, and device fabrication in a clean room environment
- Test equipment: Multichannel analyzer, soldering and circuit design, optical microscopy, Atomic Force Microscopy, and clean room protocols
- Programming: C++ (proficient) and Python (basic)
- Software: Labview, Word, Excel, and AutoCAD

Teamwork

- Collaborate within research group to explore technical topics, synthesize key results, and present reports through journal club via written documents and oral presentations
- Three years of experience providing excellent customer service in a fast-paced, help desk

Communication

- Effectively interfaced with customers to troubleshoot problems and develop solutions
- Created weekly written reports to communicate recurring issues and identify trends
- Scheduled meetings and training sessions for ~30 students and ~10 faculty per semester

Education

American University

Bachelor of Science, Physics

Minor: Mathematics

Washington, DC

Expected: May 2018

Relevant Coursework: Mathematical Methods for Physicists, Optics, Thermal Physics, Physical Chemistry I & II, Analog circuits, Digital Circuits, Sensors and Transducers

Work Experience

Tutoring Center Assistant

Student Services, American University

May 2014 – Present

Washington, DC

- Provided friendly and prompt assistance to students scheduling tutoring resources
- Developed a network of contacts and resources to resolve challenging queries
- Worked 20 hours per week while maintaining full-time student course load
- Proficient with advertising on social media and basic web design

Extracurricular Interests and Activities

Volunteer, STEM Camp for Girls

Summer 2016

American University Ultimate Frisbee

Fall 2015 – Present

Society of Physics Students

Fall 2015 – Present

Getting to Work – Tool #8: Writing an Effective Cover Letter

The cover letter that accompanies your resume is an important part of a job application. It is the first opportunity you have to engage a prospective employer, tell your story, and persuade them to contact you for an interview. *Always* send one along with your resume when applying for a job, *even if it is not requested in the ad*.

Cover letter basics

The format

The cover letter has three parts: the opening paragraph, the middle part, and the closing paragraph. It is recommended that the cover letter not exceed one page. However, there are some exceptions, (e.g., if you have participated in several relevant internships) when the cover letter could be slightly longer but should not exceed two pages in length. Again, keep in mind that if you do not grab the interest of the employer with the first page, no one will see your second page.

Opening

The first paragraph should be brief. In it, identify the name of the position to which you are applying and where you found the job advertisement. An employer (or the human resources division that receives your application) may have many openings simultaneously. Do not make them guess which one you are applying for! You may identify who referred you to the position, but only with their permission. Indicate your sincere interest in the position in the opening paragraph. This is where you show enthusiasm and interest!

Middle

The second section is the substantive portion of the cover letter, and it is typically one or two paragraphs in length. Its goal is to explicitly connect aspects of your background (e.g., phrases from your resume) with the job requirements as specified in the position description. Remember to show and not just tell why you are the ideal candidate.

Closing

This paragraph should also be brief. Thank the employer for considering your application and let them know that you look forward to the opportunity to meet in person to discuss the position. You might also include your contact information and convey that you have a flexible schedule. Reiterate your excitement and enthusiasm for joining the company/division/team.

Address the letter appropriately

Sometimes a job description lists a specific contact person. If that is the case, address the cover letter to that person. Do not assume the person is a man, woman, Dr., or any other category. Do some research on the person so that you can address the letter appropriately. If, even after some research, you are not sure about gender or title, your best option is to use “Dear [first name]” instead of “Dear Dr./Mr./Mrs./etc.” Sometimes there is no specific individual to whom you should address the letter. If that is the case, “Dear Hiring Manager” or “To whom it may concern” are equivalent and appropriate. “Dear Sirs” is not appreciated by many female managers.

Demonstrate your ability to write well

The cover letter is a professional letter; however, it need not be dull. Always use active voice and verbs, and check your spelling and grammar. Whereas making one mistake can hurt your candidacy for the job, writing eloquently can jump your resume to the top of the stack of serious contenders. An especially well-written cover letter will catch their attention. Ask someone at the university career center, a professor, or a friend to provide critical editorial comments on your draft cover letter before sending it. Avoid using big words or generic adjectives that do not have a lot of meaning. Instead, focus on being genuine, straightforward, and engaging.

Emphasize what you can contribute to the company

Be sure to convey to the employer what you would contribute to the company, not how you would personally benefit from having the job. For example, instead of telling the employer that you are excited by the prospect of this job because you want a job “close to home” or “I want to learn LabVIEW,” tell the interviewer why this is a good fit for you based on what *they* need. For example, “I am excited by the prospect of using my skills in data manipulation to help your team more efficiently process images.” Do not be dishonest, but focus on what excites you that will also benefit the company.

Do your research

Read the position description and carefully identify job requirements (e.g., knowledge and experience) and keywords. Search for additional information about the job position, the division, and the company to which you are applying.

Sell yourself.

Connect the requirements in the description with your experiences, skills, knowledge, and background. In short, highlight phrases from your resume that match the job description or stated requirements. Tell a story with specific examples of your experiences and abilities and correlate them to exactly what the employer is looking for.

For example: "I have over two years of experience using ___, the kinds of equipment that this position requires."

Mention your skills.

It is okay to indicate aspects of your personality if you think that they might be applicable. Include intrapersonal skills you possess, such as time management, initiative, dependability, self-monitoring, organization, planning, and professionalism. However, avoid sounding generic by listing several traits—pick one or two to highlight and show these traits with specific examples rather than providing a broad list. For example: "As a result of my dependability and leadership, I was elected vice president of our Society of Physics Students chapter in my sophomore year."

Exercise - Tool #8: Building the “Middle” Paragraph(s) of Your Cover Letter

⇒ For the same position description you used in Exercise #7, carry over the top five relevant key words or phrases. Then complete the second column.

Top 5 priority key words or phrases	Related “Show it” stories (from Exercise #5) - If you don’t have one for this key word or phrase, create one following the Exercise #5 guidelines.

⇒ Next, choose your strongest 2–3 “Show it” bullet points from this list and use them as the basis of the middle section of your cover letter. The cover letter is a chance to expand on the knowledge and skills highlighted in your resume with a few very brief (1–2 sentences) stories that paint a picture for the reader of what you would bring to the position to which you are applying. You are not regurgitating what is in your resume, you are expanding upon it and painting a more interesting picture about your qualifications for the reader.

⇒ With the job advertisement in one hand, the results of Exercise #7 in your other hand, and your “Show it” story list above, draft one or two paragraphs that demonstrate to the reader why you would be a good fit for this position. In your writing be sure to convey authenticity and friendliness. *Vary your sentence structure* so not every sentence begins with “I” or “My”. Doing a little research on a company, division, or group can really make the difference between a phrase being timely or falling flat.

Draft 1 of middle section of cover letter

Pass the job advertisement and your draft paragraphs to a peer, mentor, or career services professional and ask them the following questions, suggesting ways to make your case even stronger. You can also review the draft yourself, with an eye to the following questions:

- Do I clearly tie my skills and experiences to the needs of the employer?
- Are there words that sound too generic to be meaningful?
- Is my letter simple, clear, genuine, error-free, and convincing?
- Do I clearly and accurately demonstrate my skills, abilities, and interest in the position?

After receiving feedback, draft a second version of the middle section of your cover letter.

Draft 2 of middle section of cover letter

Tool #9: Acing the Interview

If you have followed all the advice and tips in this toolbox, you are many steps closer to an interview. Yet which applicants receive interviews depends on many different factors—the mood of the person reviewing the applications, whether the employer already has someone in mind for the position (perhaps an internal candidate), the method by which applications are ranked (for example, the US federal government ranks applications veterans higher than civilians), how long the position has been posted, and many more. However, by following best practices and preparing thoughtful and targeted resumes and cover letters for positions that are good fits for you, you can increase your odds of getting an interview. And by doing all of this work in advance, you have already completed most of the preparation for an interview.

An interview is an opportunity for you and an employer to determine whether or not the position is a good “fit” for both of you. The employer is selling the job to you, and you sell yourself by elaborating on the contents of your resume and cover letter. The interview is your time to impress on the employer that you are the best candidate for the position. Regardless of the industry, most employers are interested in your:

- Knowledge of the industry
- Communication (written and verbal) skills
- Interpersonal and relationship-building skills
- Leadership qualities
- Organizational and planning skills
- Problem-solving and analytical skills
- Work ethic, maturity, and determination

Depending on the job, other capabilities will be assessed more rigorously.



Types of Interviews

A great way to find out what to expect in professional interviews is through **informational interviews** and **your professional network**—ask people in similar jobs what questions they were asked in interviews and ask those who do hiring what questions they ask! Below are a few types of interviews that you may encounter.

Screening Interview: This is often the first round of the interview process and will involve basic information regarding your eligibility for the position, your ability to express your ideas clearly and your potential fit with the organization. These interviews may be in-person or over the phone and typically last 30 minutes or less.

Phone/Virtual Interview: More employers are taking advantage of technology to conduct their interviews. Don’t make the mistake of taking these interviews less seriously than you would an in-person interview. Dress professionally, have a quiet environment and prepare as thoroughly as you would for an in-person interview.

On-site (In-person) Interview: On-site interviews are excellent opportunities to see what your potential work environment will be like and allows a company to have multiple personnel interview you. Expect to spend at least two to three hours, if not an entire day. You will likely interact with human resources staff as well as technical hiring managers and possibly organization leadership. Your day may also include a presentation and an opportunity to interact with other candidates.

Case Interview: Case interviews test your ability to problem solve and think on your feet to solve the kinds of issues the organization is faced with. The employer will provide you with basic information regarding the problem and you will need to develop a logical solution. Be sure to think out loud during this process to give the employer a glimpse into your thought processes. These types of interviews are common in the consulting industry.

Technical Interview: A technical interview may stand on its own or be combined with a screening or on-site interview. The interviewer will provide you with one or more technical questions which should be solvable based on your previous coursework or experiences. As with case interviews, be sure to talk through your thought processes and show your work. The interviewer will be more interested in your approach and communication style than in you actually getting the right answer.

Preparing for an interview

Adequate and professional preparation is fundamental for mastering a job interview. To feel collected and confident going into an interview, remember the following general tips. More specific details about phone interviews and face-to-face interviews follow. Remember, what you do *before* the interview has a major impact on the overall interview experience.

1. Research your interviewer and the organization.

When you are contacted about scheduling an interview, be sure to ask who you will be interviewing with as well as which division you are interviewing in (if applicable). Before the interview, carefully research these people and that division so that you can refer to people by name and be familiar with what they and the division do. Employer research prior to the actual interview is essential. Know something about what the company does or produces, its mission statement, strategic goals and recognition they have received, and more. A typical interview question is, “*What do you know about our company?*” Review the organization’s website, research them on sites such as LinkedIn or glassdoor.com, and talk to others who are familiar with the organization and their interviewing process. If the organization has been in the news recently, you should know about it. If they conduct research, review recent papers or products.

2. Do mock interviews.

Taking part in a mock interview with the career professionals on your campus, or even your roommate, will give you an opportunity to practice answering possible interview questions out loud, enabling you to feel more comfortable and prepared when the big day arrives. There are also websites that allow you to record your interview and get feedback from third parties. Ask your interview partners to be conscious of your nonverbal communication, including your facial expressions, posture, eye contact, and body language. A mock interview gives you the opportunity to practice your verbal and nonverbal communication skills.

3. Know your main strengths and weaknesses.

Be prepared with answers to common interview questions. Questions like “*What are your main strengths and weaknesses?*” can be challenging, but with practice and some strategy, they become much easier. For example, rather than blurting out that you are terrible at computer programming when asked about your weaknesses, you might tell the interviewer that your computer programming skills need improvement but you recently started taking a class and your skills are quickly advancing. You should not point out your shortcomings with no solution for the problems in sight. On the other hand, also prepare for questions like, “*What do you do well?*” and “*What do you prefer not to do?*” Whatever the question may be, be prepared to give a positive response.

4. Have specific examples in mind that demonstrate your skills and abilities.

After completing a skills assessment, you should have several stories in mind that demonstrate different aspects of your skills and abilities. Practice articulating these stories in response to common interview questions such as, “*How well do you meet deadlines?*” or “*Tell me about a time when you had to work with a difficult person.*” Interview questions where you are asked to “tell a story” are called behavioral-based interview questions. The logic is that how you behaved in the past will predict how you will behave in the future. Be sure to include these points in your answer: a specific situation (what needed to be done), action (what you did), and result (what happened).

Common interview questions

- ▶ Why are you interested in this job?
- ▶ What is your greatest strength?
- ▶ Why are you the best candidate?
- ▶ What is your greatest weakness?

Behavioral-based interview questions

- ▶ Tell me about a time you had to think creatively to solve a problem.
- ▶ Give me an example of something you have done that shows initiative.
- ▶ Have you ever had leadership responsibilities? If so, give an example.

5. Prepare questions for your interviewer.

It is important to prepare a few questions for the interviewer about the position or company. This demonstrates your interest and professionalism and can even show the interviewer what you may bring to the team if you have a particularly insightful question. Below are some possible question topics:

- The extent to which you would work independently or as a member of a group
- Top priorities for the position
- What the interviewer enjoys most about working at the company
- Recent projects that the team has been working on
- How often you would have the opportunity to travel (if travel is in the job description)
- Possibilities for advancement within the company over time
- Opportunities for training
- The supervisor's management style
- How you will receive feedback on your job performance
- Next steps/timeline for the process

What *not* to ask:

- Anything about salary, benefits, vacations, holidays, or sick days. These things can be discussed after you get an offer.
- Overly-personal questions of your interviewer

6. Remain calm!

Keep in mind that you cannot prepare for every question, and that sometimes interviewers intentionally ask questions to see how well you respond to stressful situations. Feel free to relax, take a deep breath, and pause for a few seconds to think about a question before responding. It is also perfectly acceptable to say "I don't know," but follow it with what you would do to find a solution.

7. Be aware of illegal questions.

Employers cannot legally ask you direct questions about your race, ethnicity, citizenship, marital status, whether you've had or plan to have, children, sexual orientation, religion, age, disabilities, military service, or membership in organizations. Some states also limit the ability of employers to ask about criminal records. Employers are allowed to ask indirect questions such as "Are you eligible to work in the United States without sponsorship?" or "Will you be able to fully perform the functions of the job?" If you are asked a question you believe to be illegal, you can deflect and refocus the conversation on more relevant topics or politely say, "I prefer not to answer that question."



Special tips for phone or virtual interviews

Phone or virtual interviews are just as important as in-person interviews. In many cases, this is the key step to being selected for an in-person interview. Sometimes these interviews even take the place of in-person interviews. If you get a phone or virtual interview, take it seriously.

1. Do your homework.

Before the phone/virtual interview, review the details of the job to which you are applying and learn as much as you can about the group, division, and company.

2. Find a suitable interviewing place.

Find an appropriate interviewing location that is quiet and free of distractions. If you need to be on a cell phone or wireless network, choose a place that has excellent reception. You do not want to ask “Can you hear me now?” throughout your entire interview. Have your resume at hand, paper and a pen to take notes, and a glass of water.

3. Be positive and enthusiastic!

Even though you are not face-to-face with your interviewer, they can still tell a lot by your voice and the way you speak. It is important to show enthusiasm over the phone, especially because the interviewer cannot see your face. Also, maintain a professional attitude by wearing professional attire (if video enabled) and have good posture. Believe it or not, this can affect your demeanor in a way that the interviewer can hear.

4. Have good phone etiquette.

Do not interrupt the interviewer! Be sure to pause for a few seconds after the interviewer has asked a question because they may want to keep talking. Think about your answers and make sure you speak clearly and slowly. Using hand gestures can help you sound more natural and be able to have a more fluent and regular conversation, even if there is no one to see them. If you tend to ramble, make an effort to provide a brief answer to each question first, and then let the interviewer know that you would be happy to expand on the question if they would like to hear more.

A Phone Interview Story

I experienced my first phone interview for a position as an SPS 2013 Summer Intern. I honestly did not have any idea of what sort of questions to expect. However, I searched the organization's website and read about the position, and I read what I was asked to before the interview took place.

At the time we agreed the interview would take place, I went to an empty room, free of distractions, where I had good reception on my cell phone. The phone interview lasted about 30 minutes, and even though I was really nervous at the beginning, my nervousness calmed throughout the interview. I was asked to talk about myself, what my interests were, what work/computer programming experience I had, which books I was currently using in my courses, and the reason why I believed I was apt for this internship position. That afternoon I received an email saying I was selected to be the SPS Career Pathways Summer Intern.

In retrospect, I wish I was more professionally prepared and informed about what sort of questions to expect. I feel more confident now that I know how to be better prepared, what to do and not to do, and what/who to research. I encourage you to take phone interviews very seriously, do adequate investigation, and prepare your elevator speech.

- Ro Avila, SPS Summer Intern 2013, Career Pathways Project

Tips for face-to-face interviews

1. Dress professionally for your potential job title.

Knowing how to dress appropriately for a job interview can be challenging—make sure to ask someone with experience in a related job what to wear. If you do not have suitable clothing, consider purchasing an interview outfit. If that is not an option, borrow a clothing from a friend or relative. Some career offices also have an interview closet with clothes that students can borrow.

Your attire should be an illustration of your confidence and desire to succeed. An informational interview is a way to observe workplace clothing, but for an interview, your appearance should clearly indicate your purpose: to get the job.

General guidelines for “what to wear”

You want to make a great first impression. That's why you want to dress professionally for a job interview, regardless of the work environment.

- ▶ A suit or equivalent is generally the best option though the range can be from formal business attire to casual business attire. Make sure your clothing fits you well.
- ▶ You don't want to be the most informally dressed person there.
- ▶ Jeans, t-shirts, athletic shoes, and flip-flops are not appropriate for any interview.
- ▶ Shoes should be dress or nice casual. Remember that you may be invited to walk around a workplace, so be prepared with shoes that look nice but allow you to walk around confidently and comfortably.
- ▶ Business casual is not the same as casual.
- ▶ Your attire can influence how you are perceived by others. Again, you don't want to be the most informally dressed person there.
- ▶ Be sure that whatever you select is clean and wrinkle-free. A dry cleaner can iron for you.
- ▶ Be mindful of your accessories and personal grooming. Jewelry should be understated and not distracting. Your hair should be neat and well groomed. Nails should be trimmed and clean. Deodorant is advised but avoid perfume or cologne – you'd hate for your interviewer to have an allergic reaction!
- ▶ **You do not want your appearance to distract from your skills.**

If you are unsure about your attire, consult someone who has a similar job to the one for which you are interviewing; sometimes faculty members may not be your best resource for learning about interviewing outside of academia. There are numerous websites available that describe “professional attire.” Take the time to do some research. Not only will you look professional, your employer will realize you took your job interview seriously. **It is always better to be overdressed than underdressed.**

2. Be on your best behavior at all times.

Even if you are buying coffee a block away or chatting with your future supervisor's secretary before your interview, treat everyone with respect. Every interaction counts!

3. Turn off your phone.

Turn off your phone before you enter the facility. Do not wait until the interview begins.

4. Bring materials.

Be sure to have:

- Extra copies of your resume (particularly if you have made any updates since your initial application)
- List of references
- Pad of paper (or equivalent) and writing implement
- Transcript (unofficial is OK)
- Writing sample (a 2-3 page class assignment is usually sufficient)

5. After the interview

After every interaction you have with interviewers, be sure to thank the people you have met for their time. A thank you letter is not just a chance to express your gratitude, it's also another chance to show your writing skills and share any information you may not have mentioned during your interview.

Best practice is to send a tailored thank you email to each person you met or talked with within 24 hours of your interview. Following that up with a hand written note is an extra wow!

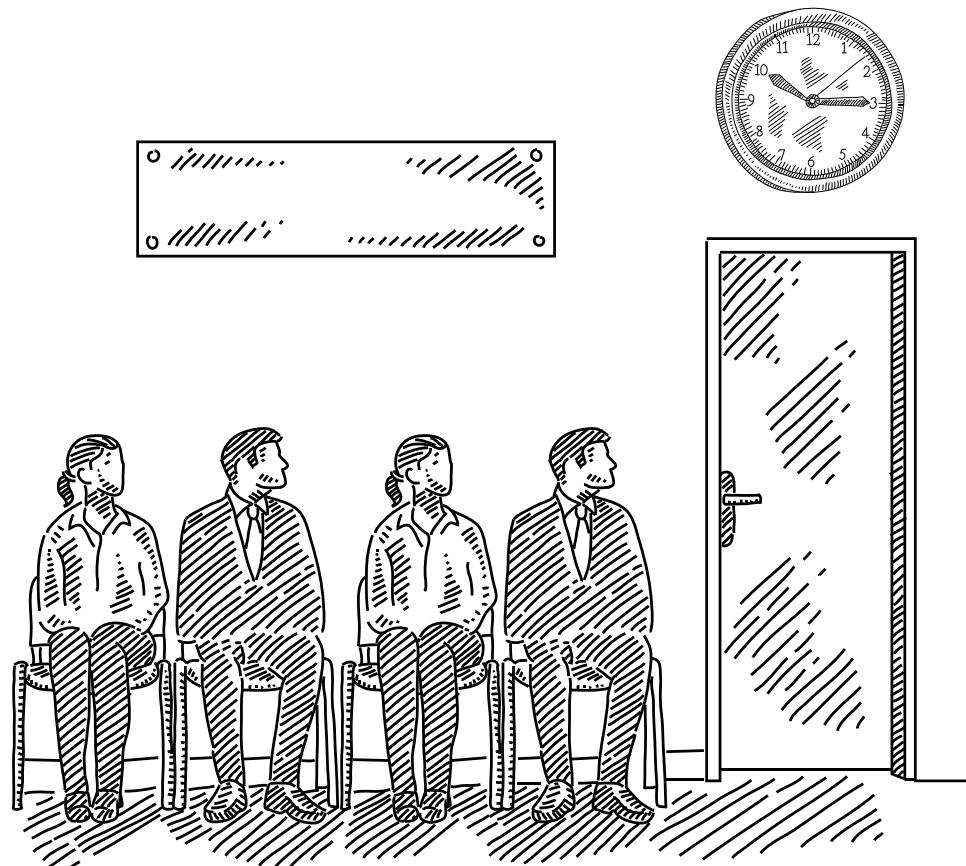
Hopefully at the end of the interview, you received information regarding timeline and next steps. If the deadline for a decision passes and you have not heard anything, it is absolutely appropriate to send a polite email to your primary point of contact to ask about the status of your application.

6. Evaluating Offers

The goal of an interview is to get a job offer. Once you have received an offer, resist the temptation to jump at the first one. Take time to evaluate it. Once you accept an offer, you should cease all other job search activity and not renege on your acceptance.

You may wish to negotiate with your prospective employer on your salary and other benefits. When entering into these discussions be sure to have done your research on the fair market value of the position in the geographical location where you will be working. Cost of living can vary dramatically in different areas. Be sure to take advantage of the knowledge of career professionals at your school as they can help you navigate the evaluation process.

If you receive another job offer while you are waiting to hear back, you can let the employer know that another offer has been extended to you and you would like to have their decision so you can make an informed choice. If you choose to accept the other offer, please contact any pending decisions to withdraw your name from consideration.



Sample Interview Questions

- Tell me about yourself.
- Why are you interested in working for this company?
- Tell me about your education.
- Why have you chosen this particular field?
- Describe your best/worst boss.
- In a job, what interests you most/least?
- What is your major weakness?
- Give an example of how you solved a problem in the past.
- What are your strengths?
- How do others describe you?
- What do you consider your best accomplishment in your last job?
- Where do you see yourself in three years?
- Think about something you consider a failure in your life, and tell me why you think it happened.
- How do you think you will fit into this operation?
- If you were hired, what ideas/talents could you contribute to the position and our company?
- Give an example of where you showed leadership and initiative.
- Give an example of when you were able to contribute to a team project.
- What have you done to develop or change in the last few years?
- Do you have any questions for me?

Behavioral-based Questions

(from www.thebalance.com/behavioral-job-interview-questions-2059620)

- Give an example of an occasion when you used logic to solve a problem.
- Give an example of a goal you reached and tell me how you achieved it.
- Give an example of a goal you didn't meet and how you handled it.
- Describe a stressful situation at work and how you handled it.
- Tell me about how you work effectively under pressure.
- How do you handle a challenge?
- Have you been in a situation where you didn't have enough work to do?
- Have you ever made a mistake? How did you handle it?
- Describe a decision you made that was unpopular and how you handled implementing it.
- Did you ever make a risky decision? Why? How did you handle it?
- Did you ever postpone making a decision? Why?
- Have you ever dealt with company policy you weren't in agreement with? How?
- Have you gone above and beyond the call of duty? If so, how?
- When you worked on multiple projects how did you prioritize?
- How did you handle meeting a tight deadline?
- Give an example of how you set goals and achieve them.
- Did you ever not meet your goals? Why?
- What do you do when your schedule is interrupted? Give an example of how you handle it.
- Have you had to convince a team to work on a project they weren't thrilled about? How did you do it?
- Give an example of how you've worked on a team.
- Have you handled a difficult situation with a co-worker? How?
- What do you do if you disagree with a co-worker?
- Share an example of how you were able to motivate employees or co-workers.
- Do you listen? Give an example of when you did or when you didn't listen.
- Have you handled a difficult situation with a supervisor? How?
- Have you handled a difficult situation with another department? How?
- Have you handled a difficult situation with a client or vendor? How?
- What do you do if you disagree with your boss?

Exercise - Tool #9: Preparing for an Interview

The best preparation for an interview is practice! You have already identified your skills (your well-developed bullet points) and listed some of your experiences (your “Show it” stories), and an interview is the place where you can really highlight these in detail.

Although you will not know for sure what questions you will be asked in an interview, there are some common types of questions you can prepare for by thinking through your responses and saying them out loud. Use the space below to write down notes about how you might answer the samples interview questions from the section above along with the additional questions below based on your bullet points and stories, and then have a friend ask you the questions so you can practice responding verbally.

Opening Questions

Tell me about yourself (remember your elevator speech, Tool #4!).

Why are you interested in this position (and/or working for this company/organization)?

What would you bring to this position?

Skills Questions

Describe your experience with (relevant software/equipment/subject matter). What have you used it for?

What skills would you bring to this position/company/organization?

Describe the most challenging written technical report or presentation that you have had to complete.

Give me an example of a time when you applied analytical techniques to define a problem and come up with a solution.

What are you doing to stay up-to-date with the latest technology?

Tell us about a time when you used your engineering skills to solve a real-life problem.

Don’t forget to schedule mock interviews with professions, alumni, and your career professionals on campus.

Practice a few replies here:

SECTION 4:

CAREER PREPARATION AND YOUR DEPARTMENT

Section 4: Career Preparation and Your Department

Affecting Change in Your Department

In general, physics departments do a good job of preparing students for graduate school. However, if they have followed a primarily linear academic employment path, faculty mentors may not have experience with seeking employment at the bachelor's degree level. Despite this, departments can be effective in their efforts to create an environment that supports and prepares students who choose to enter the workforce after completing the bachelor's degree. As part of the AIP Career Pathways Project, we investigated eight schools with a demonstrated record of success in preparing students to enter the workforce after completion of the physics bachelor's degree. From these studies, we developed a list of "common features." Many of these features appear in the highly regarded "2003 Strategic Programs for Innovations in Undergraduate Physics" (SPIN-UP) project report recommendations for physics departments "that work."

Common features of successful departments

We found several common features among departments that have strong records of preparing students to enter the STEM workforce after earning a physics bachelor's degree. You might consider sharing these with the faculty in your department to give them ideas about things that your department does well or might consider adding.

Curricular features

- Varied and high-quality lab courses
- Research opportunities for undergraduates
- Curricular flexibility
- Communication skills as part of the undergraduate physics experience
- Computer programming integrated within courses
- Open-ended research

Extracurricular features

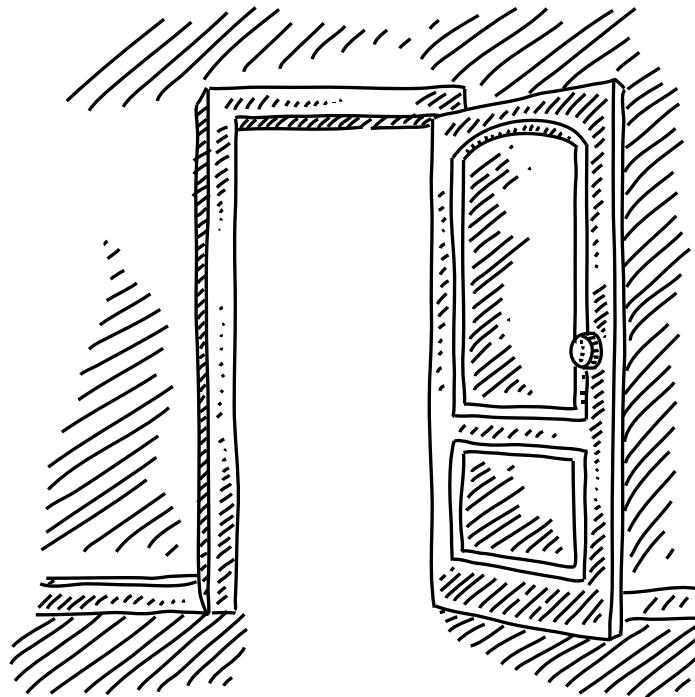
- Faculty and staff commitment to the success of all students
- Strong community of students
- Connections with alumni
- Relationship with the Career Services Office
- Mentoring and advising physics majors in accordance with their interests and goals
- Opportunities for physics majors to be involved in outreach activities
- Student lounge - collaboration & study area

Communicating with Campus Career Professionals

Although most campuses have an office dedicated to helping students find employment after graduation, often physics students do not make good use of this resource. This may be due to lack of awareness, plans to attend graduate school, or a belief that the office does not have much to offer physics students. As discussed in this toolbox, the abilities, skills, and knowledge that physics bachelor's degrees have to offer employers are often not well understood. However, if students, physics faculty, and career professionals work together on career issues, evidence suggests they can make great strides!

Here are some ways that you and your department might interact with the career professionals on your campus:

- Consider inviting one of the career coaches or counselors to an SPS meeting for a conversation about careers for physics students. Include faculty.
- Share the list of common job titles for physics students with the career services office. A list of suggested job databases and any other information you may come across regarding career-related opportunities may also be helpful.
- Visit the career office! They are likely to be a valuable resource when it comes to things like formatting a resume once you have identified your set of knowledge and skills, obtaining feedback on cover letters, and preparing for interviews. Work with faculty or your Society of Physics Students chapter to host a workshop series presented by career services. Topics could include: what to do with my bachelor's degree, resumes, cover letters, getting experience as an undergraduate, and interviewing.
- Ask your physics department to host an all-majors meeting, and ask campus career professionals to co-present with faculty on career topics (for example, career decision making, internships and research experiences, the job search, or resume and cover letter writing).
- Encourage campus career professionals to reach out to local, regional, and national employers who recruit physics majors.
- Offer to cohost a STEM career fair, partnering to bring STEM employers to campus.
- Create groups on LinkedIn for physics majors and invite faculty, students, and alumni to join the group. Post relevant articles and news related to options for physics undergraduates.



Resources for Physics Students

Below is a list of general physics and STEM-related career information resources.

SPS Jobs | jobs.spsnational.org

SPS Jobs has job listings appropriate for students seeking employment with a bachelor's degree in physics.

Physics Today Job Resources | www.physicstoday.org/jobs/career_resources

SPS Career Resources | www.spsnational.org/career-resources

Visit this Society of Physics Students site for career-related information, including profiles of people working in different careers, advice, and links to related resources.

Who's Hiring Physics Bachelor's? | www.aip.org/statistics/whos-hiring-physics-bachelors

Click on a state to see a list of some of the employers that hired physics bachelor's recipients recently in that state.

AIP Statistics: Skills Physics Bachelor's Use | www.aip.org/statistics/reports/physics-bachelors-initial-employment2014

This link will take you to a report titled, "Physics Bachelor's Initial Employment." Figure 4 in this report shows the skills used by physics bachelor's recipients in their first job. Use these lists when you are thinking about the knowledge and skills you have. Make sure these are highlighted in your resume.

APS Careers Website | www.aps.org/careers

Access a host of career resources at the APS Careers website, including links to the APS Webinar Archive, Career Workshops from annual meetings, links to a professional development guide, and information on Student Travel Awards and Future of Physics Days events at APS national meetings, specifically geared toward undergraduates.

Grad School Shopper | www.gradschoolshopper.com

Investigate graduate programs in physics, astronomy, and the physical sciences. Available in both book and online, you can easily compare programs through specialty, admission criteria, faculty, department information and more.



www.spsnational.org/career-resources

www.aip.org