

Careers Toolbox

for Undergraduate Physics Students & their Mentors



American Institute of Physics Career Pathways Project

AIP Statistical Research Center

Society of Physics Students

www.spsnational.org/cup/careerpathways/

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Table of Contents

Career Pathways: Background	3
Acknowledgments	4
The AIP Career Pathways Project: Overview	6
Why look at careers for undergraduate physics students?	6
AIP Career Pathways Project details	7
The AIP Career Pathways Toolbox	8
What can students gain from working through the toolbox?	9
How to use this toolbox	9
Knowing the Options	10
Where do physics graduates go?	10
 Section 1: Exploring Options, Finding Opportunities	 13
Exploring Options, Finding Opportunities	14
Options and Opportunities – Tool #1: Common Job Titles	15
Common areas where physics bachelor's degree recipients find employment:	15
Common job titles of physics bachelor's degree recipients	16
Exercise - Tool #1: Common Job Titles	17
Options and Opportunities – Tool #2: Informational Interviews	18
The basic concept	18
Why do informational interviews?	18
Preparing for informational interviews	18
Why informational interviews are so powerful	20
Conducting an informational interview	20
Following up after the informational interview	20
Exercise - Tool #2: Your Informational Interviews	21
Informational interview record	22
Informational interview record	23
Options and Opportunities – Tool #3: Networking	24
General networking tips	24
More about the elevator speech	26
Exercise - Tool #3: Networking Skills – Constructing your elevator speech	27
 Section 2: The Missing Link	 29
The Missing Link: Assessing your Knowledge and Skills	30
The Missing Link – Tool #4: Knowing Your Skills	31
Common Skills of Physics Students	33
Skill: Working with laboratory instruments	33
Skill: Conducting research	33
Skill: Proficiency with computer hardware and software	33
Skill: Communicating complex ideas	34
Skill: Analysis and quantitative thinking	34

Skill: Working with others	34
Skill: Problem solving and critical thinking	34
Summary: Commonly used skills	35
Exercise - Tool #4 – Part 1: Assessing Your Skills – Brainstorming your experiences	36
My Experiences	36
Exercise - Tool #4 – Part 2: Assessing Your Skills – Identifying skill sets from your experiences	37
My Skills Summary	41

Section 3: Getting to Work **43**

Getting to Work – Tool #5: Effective Job Searching	44
The online job search	44
The job fair	45
Networking	47
How do you know when you have a good match?	47
Exercise - Tool #5: Effective Job Searching	48
Getting to Work – Tool #6: Putting YOU on Paper—The Resume	49
Resume essentials	49
Individualize your resume to the job	51
A word about describing your abilities	51
A word about asking for references or recommendations	51
Exercise - Tool #6: Building the “Knowledge and Skills” Section of Your Resume	52
Getting to Work – Tool #7: Writing an Effective Cover Letter	54
Cover letter basics	54
Address the letter appropriately	54
Demonstrate your ability to write well	55
Emphasize what you can contribute to the company	55
Exercise - Tool #7: Building the “Middle” Paragraph(s) of Your Cover Letter	56
Standing Out – Tool #8: Acing the Interview	58
Preparing for an interview	58
Special tips for phone interviews	60
More tips for face-to-face interviews	61
Exercise - Tool #8: Preparing for an Interview	63

Section 4: Career Preparation and Your Department **65**

Affecting Change in Your Department/Program	66
Common features	66
Action items – Ways for students to have influence in the department	66
Communicating with Campus Career Professionals	67
Resources for Physics Students	69

References **70**

Career Pathways: Background

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AIP Career Pathways Project Investigators

- Roman Czujko, Director – AIP Statistical Research Center
- Thomas Olsen, former Assistant Director – Society of Physics Students, AIP Education Division
- Kendra Redmond, Programs Manager – Society of Physics Students, AIP Education Division
- Toni Sauncy, Director – Society of Physics Students and Sigma Pi Sigma, AIP Education Division

Career Toolbox Authors

- Kendra Redmond, Programs Manager – Society of Physics Students, AIP Education Division
- Toni Sauncy, Director – Society of Physics Students and Sigma Pi Sigma, AIP Education Division

Career 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

Career 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

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. 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 on the basis of outstanding academic achievement. This unique two-in-one society operates within the American Institute of Physics, an umbrella organization for several other professional science societies. www.spsnational.org

The American Institute of Physics is an organization of prestigious scientific societies in the physical sciences, representing scientists, engineers, and educators. AIP offers authoritative information, services, and expertise in physics education and student programs, science communication, government relations, career services for

science and engineering professionals, statistical research in physics employment and education, industrial outreach, and the history of physics and allied fields. AIP publishes *Physics Today*, the most influential and closely followed magazine of the physics 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

The AIP Career Pathways Project: Overview

In 2010, the American Institute of Physics (AIP) was awarded a grant from the National Science Foundation aimed at understanding how physics departments can most effectively prepare undergraduate students for the science, technology, engineering, and mathematics (STEM) workforce.¹ The project is a collaboration between the AIP Education Division (AIP-Ed), which houses the Society of Physics Students, and the AIP Statistical Research Center (AIP-SRC). The work has resulted in a number of insights for faculty and administrators in physics programs, along with a robust set of tools for undergraduate physics students.

Why look at careers for undergraduate physics students?

This work was carried out in response to calls for an increase in the size and diversity of the STEM workforce that have emerged over the past decade, and the knowledge that physics graduates are highly successful participants in the STEM workforce, working in a variety of positions and earning competitive salaries. Undergraduate physics programs, with effective recruitment, retention, and appropriate preparation of students, have the potential to add significantly more to the numbers and diversity of excellent members of the STEM workforce.

In many undergraduate physics departments, the primary focus is on preparing students for physics graduate school. Despite this, only about 40% of the bachelor's degree recipients in physics will go on to graduate school in physics; the remainder will go to graduate school in another field or enter the STEM workforce. This work attempts to increase the number and diversity of students that earn a physics bachelor's degree and enter the workforce by addressing obstacles such as:

- Lack of information on the part of faculty, administrators, campus career professionals, students, and prospective students regarding the wide variety of opportunities in the workforce available to physics bachelor's degree recipients.
- Lack of information on the part of faculty, administrators, campus career professionals, students, and prospective students regarding the pathways to careers outside of academia for physics bachelor's degree recipients.
- Lack of information on the part of faculty, administrators, campus career professionals, students, and prospective students regarding the financial remuneration and other benefits associated with these opportunities.

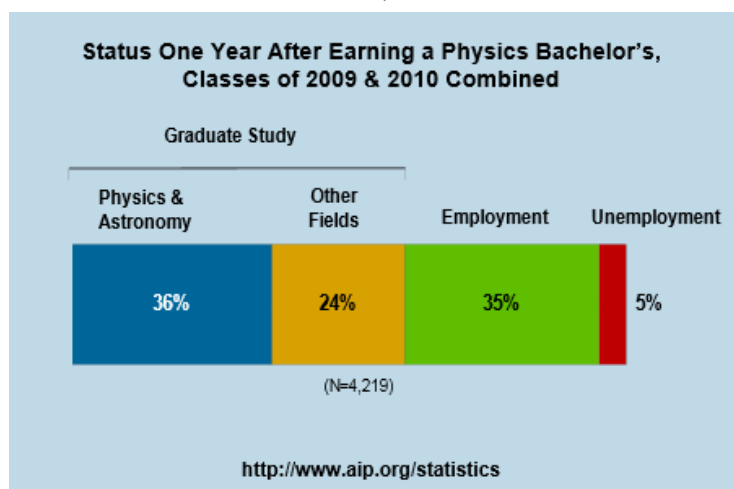


Figure 1: Of the combined 2009 and 2010 graduating classes of physics bachelor's degree recipients, 60% were enrolled in graduate programs by the winter following their degrees, and the remaining 40% entered the workforce.

AIP Career Pathways Project details

Through site visits to a diverse set of physics departments that are intentional about career preparation and graduate high numbers of students that enter the STEM workforce upon completion of the bachelor's degree, the project explored best practices for preparing physics students to enter the STEM workforce.

The information gained in the study is being disseminated through a set of reports, articles, and workshops for students, faculty, and administrators. In addition, this toolbox for physics students was created based on the findings of the investigation, along with significant input from undergraduate physics student summer interns and others. The reports and the toolbox are being distributed to faculty and students at national meetings of scientific societies and regional workshops, and will be accompanied by a set of online resources so that all physics departments have access to best practices and related tools.

Students completing the undergraduate degree in physics are unique.

This is one of the ideas that motivated the AIP Career Pathways Project. In completing an undergraduate physics degree, whether a bachelor of science degree or a bachelor of arts degree, whether in a large research institution or a small liberal arts college or any institution in between, the physics degree is often one of the most revered (and feared) majors. In general, physics students who successfully navigate the requirements to graduate gain a set of skills and knowledge that is unlike most other degree programs. The combination of solving difficult theoretical constructs, mastering hands-on experimental techniques, wrangling data acquisition and analysis, error analysis, technical writing, and more develops critical thinking and problem-solving skills that can be applied to nearly any kind of challenging situation.

The kinds of problem-solving abilities gained by undergraduate physics students are desirable in a wide range of work settings. However, the transition between undergraduate preparation and landing a great job can be challenging.

Some transition obstacles include:

- 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 in which individuals with a physics background are often employed.

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

What can students gain from working through the toolbox?

- Awareness of the wide range of career options for students who successfully complete an undergraduate degree in physics, including where and how to seek opportunities for employment.
- Understanding of how to find and make effective use of existing career-related resources in order to achieve their career objectives.
- Understanding of some of the obstacles that can hinder students from achieving their desired career goals and how to overcome those obstacles.
- Empowerment to affect change within their own department by engaging faculty mentors, making connections with career professionals, and making use of resources produced by the AIP Career Pathways Project.

How to use this toolbox

The tools presented here are the culmination of information gleaned from the AIP Career Pathways site visits and work by SPS summer interns. Some of the tools are built upon widely available career resources.

- The Careers Toolbox for Undergraduate Physics Students is unique because it has been tailored especially for physics students. The toolbox will be as useful as you make it, since effective career preparation requires dedicated time and effort on your part.
- Many of the tips and techniques presented here can be used as early as the first year of your undergraduate experience, but if you are in your junior or senior year, it is never too late to start!
- Most of the tools are intended to be iterative. You should revisit the skills and knowledge assessment frequently, update your elevator speech often and continue to build your network throughout your undergraduate career and beyond.

Knowing the Options

Where do physics graduates go?

Physics undergraduates have access to multiple opportunities upon completion of the bachelor's degree in physics. This is verified by a collection of statistical data, shown below. These data give an overview of the paths followed by students who complete a baccalaureate degree in physics (BS or BA).

Some students go on to graduate school

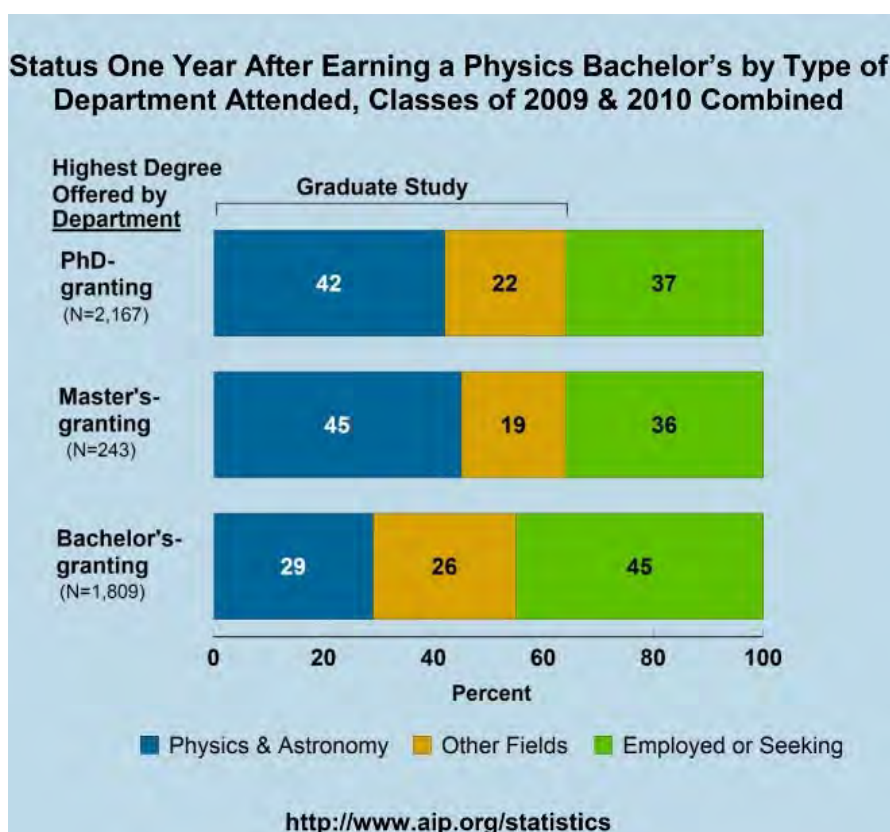


Figure 2: Of those students who graduated with a physics degree in the classes of 2009 and 2010 that went to graduate school, about 39% went in physics or astronomy, and just over 20% went in other fields.

Overall, about 60% of all physics bachelor's graduates go on to graduate school of some kind.

Many physics bachelor's degree recipients go directly into the workforce

Figure 2 also shows that about 40% of physics bachelor's degree recipients from the classes of 2009 and 2010 went directly into the workforce after graduation. Figures 3 and 4 provide details about the type of employment found by those 40%.

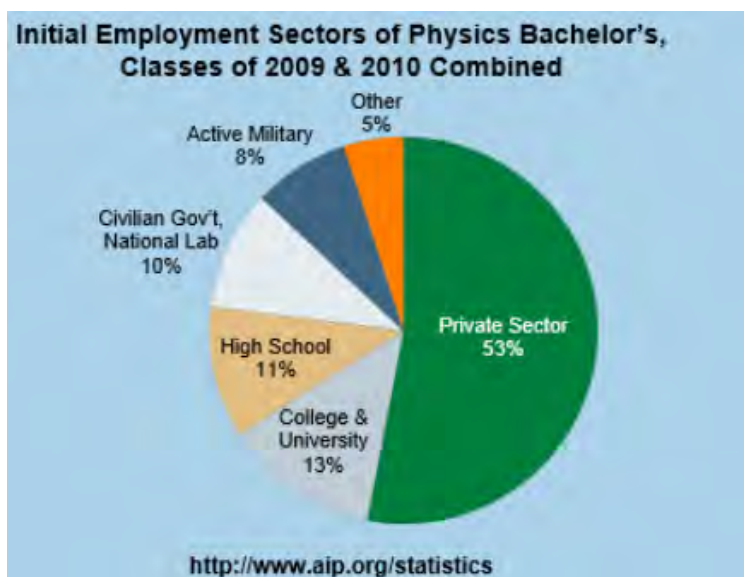


Figure 3: Initial employment of physics bachelor's degree recipients.

Figure 3 shows that of the more than one-third of the physics graduates that entered the workforce after earning a bachelor's degree, the largest percentage went into the private sector, although some went into government, academia, or teaching positions.

There are a wide variety of employment opportunities for students completing a bachelor's degree in physics. Evidence shows that the opportunities vary by geographic location, but there are some broad categories that employ large fractions of the bachelor's recipients that enter the private sector, namely, *engineering* and *computer or information systems*, as shown in Figure 4.

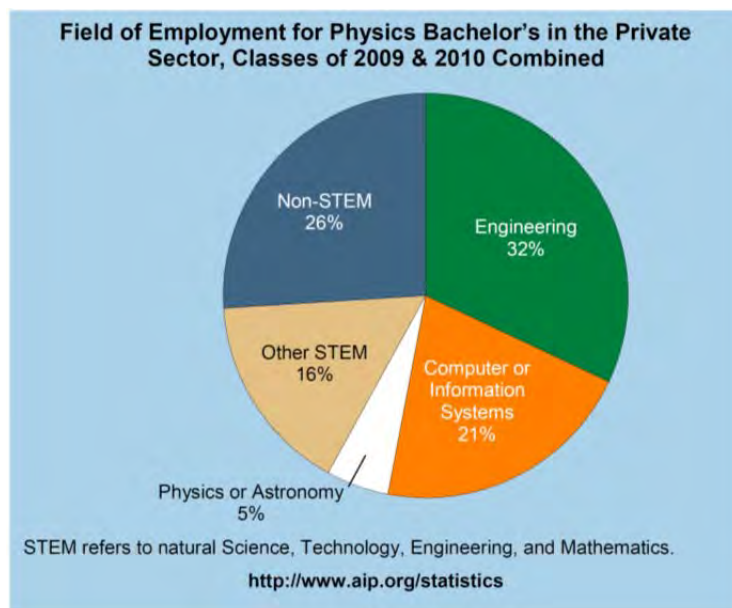


Figure 4: Employment fields for physics bachelor's degree recipients in the private sector.

The salaries earned by physics bachelor's

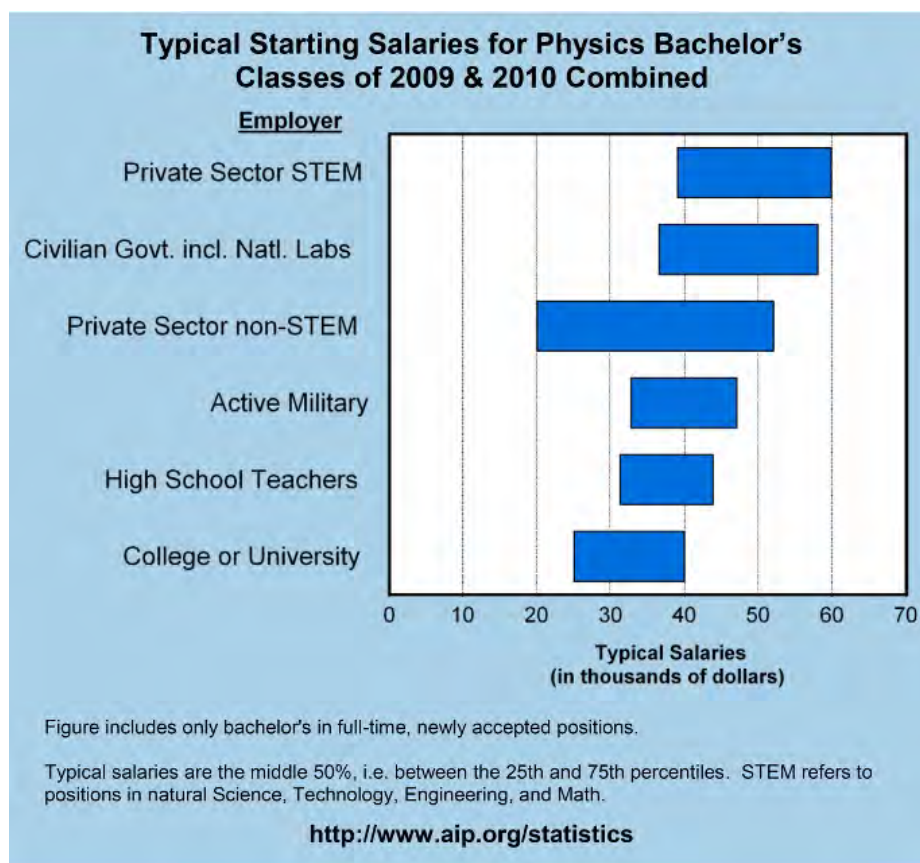


Figure 5: Starting salaries data for physics bachelor's degree holders.

Physics bachelor's recipients who enter the workforce report respectable starting salaries, even when compared to other fields.

Related Resources

- Who is Hiring Physics Bachelor's?
The AIP Statistical Research Center has a listing by state of physics bachelor's employers as reported by physics graduates hired at those places. To view this resource, visit <http://www.aip.org/statistics/trends/states/state.html>.
- For more information on the initial employment of physics bachelor's, see the report “**focus on Physics Bachelor's Initial Employment**” by the AIP Statistical Research Center (September 2012), <http://www.aip.org/statistics/reports/physics-bachelor's-initial-employment> and the report “**focus on Physics Bachelor's One Year Later**” (June 2012), <http://www.aip.org/statistics/reports/physics-bachelor's-one-year-later>.

Section 1: Exploring Options, Finding Opportunities

Exploring Options, Finding Opportunities

As shown in the previous section, a bachelor's degree in physics can lead to a wide variety of options.

The variety of options open to physics bachelor's degree recipients is good news, but navigating all of the options can be overwhelming. The AIP Career Pathways Project focuses on students entering the workforce after graduation. But even those students who choose to go to graduate school will eventually be looking for a job! In addition, many of these tools can be applied to finding internships, research positions, or even entrance into graduate programs.

Because there are so many possible paths available to physics students, deciding on the right fit for their unique set of knowledge, skills, and most importantly, interests presents difficulties for most students. This section is designed to help students learn about some important resources for exploring the options and tips for finding (and creating) opportunities.



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 is a good way to narrow down your interests and identify the areas in which you would like to do **informational interviews** (see tool #2). There are four main areas where physics bachelor's degree recipients find employment, and the common job titles presented are divided into these areas. For specific details about the nature of work for each job title, spend some time doing online searches.

Note that you can find physics majors in ALL kinds of professions—science writing, medicine, law, history of science, acting, music, healthcare, and the list continues 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 2009 and 2010. This list is not exhaustive or exclusive.

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

Engineering: The largest percentage of physics bachelor's recipients that go directly into the STEM workforce get a job in an engineering field.

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 it involves considerable amounts of mathematics and software skills, albeit in areas like finance.

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 teach mainly related subjects like chemistry and math.

Common job titles of physics bachelor's degree recipients

Engineering

Systems Engineer	Application Engineer
Electrical Engineer	Development Engineer
Design Engineer	Engineering Technician
Mechanical Engineer	Field Engineer
Project Engineer	Process Engineer
Optical Engineer	Process Technician
Manufacturing Engineer	Product Engineer
Manufacturing Technician	Product Manager
Laser Engineer	Research Engineer
Associate Engineer	Test Engineer
Technical Services Engineer	General Engineer

Computer Hardware / Software

Software Engineer
Programmer
Web Developer
IT Consultant
Systems Analyst
Technical Support Staff
Analyst

Education

High School Physics Teacher
High School Science Teacher
Middle School Science Teacher

Research and Technical

Research Assistant
Research Associate
Research Technician
Lab Technician
Lab Assistant
Accelerator Operator
Physical Sciences Technician



Source: These job titles were obtained from surveys conducted by the Statistical Research Center of the American Institute of Physics of physics bachelor's recipients of the classes of 2009 and 2010.

Exercise - Tool #1: Common Job Titles

- ⇒ Read through the list of common job titles and jot down any that sound interesting to you. To learn more and to see other options, visit some sites that feature profiles of physicists working in other areas.

Job titles I am interested in...	
Top four job titles I am interested in...	

Resource Box: Profiles of people in physics

www.spsnational.org/cup/profiles/
Careers Using Physics, by the Society of Physics Students

www.physicscentral.org/explore/people/
Physics Central, by the American Physical Society

www.aps.org/careers/physicists/profiles
Physicist Profiles, by the American Physical Society

www.physics.org/careerprofiles.asp
Physics.org, by the Institute of Physics

EXERCISE #1

- ⇒ For each job title 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:

- ⇒ In the box below, record the job titles that you are interested in learning even more about.

Job titles I need to learn more about

- ⇒ If desired, repeat this exercise for additional job titles.

Options and Opportunities – Tool #2: Informational Interviews

An informational interview is a technique used to explore the details of a particular job. Conducting informational interviews can help you develop a deeper understanding of a specific job and give you an advantage when you start applying. It is a way for you to investigate career options *before* it is time to actually job hunt.

The basic concept

An **informational interview** is a professional meeting with an individual who has a job that you are interested in having. You request an appointment for the purpose of asking questions about the job and company and evaluating the extent to which your interests, knowledge, and skills match that kind of job. By doing multiple informational interviews, you can get a good sense of the career path that you would like to pursue—and those that you do not want to pursue! Informational interviews are an ideal way for physics students to learn about different jobs, because their advisors, physics faculty, usually have little experience outside of academia and so are limited in the guidance they can provide.

Why do informational interviews?

1. 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.
2. Informational interviews enable you to see an individual in an actual job environment and determine if this environment is right for you.
3. Informational interviews provide an opportunity to seek advice from someone working in the field. This allows for a more informed career choice.
4. Informational interviews help you initiate professional relationships and expand your network of contacts in a nonthreatening way.
5. Informational interviews help you to develop your communication skills and self-confidence in talking with professionals in a low-pressure interview environment.

Preparing for informational interviews

Finding people to interview

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

Making contact

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 you like.

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 and clear, and state that you are a student asking for the opportunity 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).

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.

Bear in mind that an informational interview is *not* a job interview. You can bring your resume or business cards, but avoid asking questions about whether or not specific employment opportunities exist in the company. Do not offer your resume to the interviewee unless he or she asks 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. The guidelines below are useful to keep in mind as you prepare questions.

Table 1: Informational interview guidelines

"DOs"	"DO NOTs"
<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 this influence 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.

Example Questions

The following are some topics on which you might base 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 job 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 open positions are 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. For example, what does the company look for that might differ from a resume for an academic setting?

Why informational interviews are so powerful

Informational interviews really work! As a young professional, you will gain valuable insight into the culture of a potential workplace. In addition, most people really enjoy talking about their jobs and their career field choice. Most people are flattered that you have taken the initiative to ask for their advice and assistance with your career and future. And, in general, most people have experienced career transitions and are happy to share their story in an effort to help others.

Conducting an informational interview²

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**. Bring a notepad to take notes and your written list of questions.

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 interviewee 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.

Exercise - Tool #2: Your Informational Interviews

EXERCISE#2

⇒ Carry over the job titles you are most interested in from the bottom of exercise 1.

Job titles worth learning more about:

⇒ Consider what you would like to know about each job, and 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 avenues for ideas.

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 (or phone number):

⇒ Questions to ask:

⇒ Notes from interview:

⇒ Follow-up steps:

Thank you sent (date):									
On a scale of 1–10, how interested I am in pursuing a job like this:									
1	2	3	4	5	6	7	8	9	10
Additional follow-up:									

Informational interview record

Informational Interview with:	
Job title:	Date:
Company:	Time:
Email address:	Location (or phone number):

⇒ Questions to ask:

⇒ Notes from interview:

⇒ Follow-up steps:

Thank you sent (date):									
On a scale of 1–10, how interested I am in pursuing a job like this:									
1	2	3	4	5	6	7	8	9	10
Additional follow-up:									

Options and Opportunities – Tool #3: Networking

Having great credentials is important when you begin searching for a job, but networking—making professional contacts—is an important way to make personal connections that can assist you in your search. Personal contacts can expand your access to opportunities, particularly those which may not be widely advertised. They can also provide valuable advice and guidance as you go through your search.

General networking tips

**NOTE TO SELF:
CONDUCTING AN
INFORMATIONAL
INTERVIEW IS THE
ULTIMATE NETWORKING
TECHNIQUE.**

Prepare an “elevator” speech

An elevator speech is a 30-second introduction of yourself (about the time you would have to introduce yourself to someone in an elevator). In it, you should briefly mention who you are, what you are doing, and where you hope to go in the future. Include something that will catch and engage the other person’s attention, such as how you became interested in physics or your current research project. Once you have your speech outlined, use it!

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. Every event is a potential networking event. You never know when or where you are going to encounter your next boss. 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?

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

Attend physics meetings

Nearly all of the 18 SPS geographic zones host meetings each year, which 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 (AAPT), have regional meetings that are a great way 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

**THE PEOPLE YOU MEET
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LINK TO YOUR FUTURE
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UNDERESTIMATE A
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OPPORTUNITY.**

proximity to your school, make an effort to attend. For example, APS, 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 which are great networking venues. Attend a meeting as an SPS reporter and for some meetings you can get a press pass in addition to earning money for travel, which is a great excuse to introduce yourself to notable scientists. For more information about the SPS Reporter Program, see <http://www.spsnational.org/programs/awards/reporter.htm>.

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 fluently 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 about working for your company?)

Listen carefully, make appropriate comments, and ask intriguing questions. People like to share their stories, so let them do the talking and wait for the invitation to talk about yourself.

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: *APS March Meeting 2014, email about 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.

Project a positive attitude

Go into networking events with a positive outlook and be confident in your ability to have a meaningful conversation. Think through your approach and prepare for networking opportunities. 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

- The elevator speech is the 30-second version of who you are, what you've accomplished, and where you hope to go in the future. This 30 seconds 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.

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

Since you are a person of above average intelligence (you are a physics student, after all), A is out of the question and you choose B (or “C. Both A and B”). So, how do you do this?

Give Your Elevator Speech. The elevator speech is the professional way (that you have already rehearsed) to introduce yourself. The goal of the elevator speech is to quickly demonstrate your interest and professionalism in the hopes of engaging the other person in conversation.

Note that you may want to develop a couple of different elevator speeches, each aimed at different audiences. 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).”

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.

Exercise - Tool #3: 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? (Be sure to include your name and where you go to school!)

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

What do I want to do?

⇒ Next, use the 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, potential informational interviewee, etc.).

General Audience

Outline of my elevator speech (1):

Specific Audience

Outline of my 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.

Section 2: The Missing Link

Assessing your knowledge and skills

The Missing Link: Assessing your Knowledge and Skills

Once you have spent some time exploring your options, identifying what kind of jobs interest you, and building a professional network, it is time to start preparing for the formal application process. As a physics student you are prepared to tackle a wide variety of different kinds of jobs (most of which do not contain the word “physics” in the title), but it can be challenging to effectively convey your skills and knowledge in a way that is meaningful to someone unfamiliar with the experiences of a traditional physics student. It is true that the specific classes and curriculum may differ from school to school, but there is a broad common experience among students who study physics and complete the bachelor’s degree. This section is aimed at those students.

Convincing someone that the knowledge and skills that you have gained in attaining a physics degree are a great match to a specific job requires you to clearly communicate not just what you know, but **how what you know is of benefit to the 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.

When you have a clear idea of what you know and how that knowledge and skill set can be applied to jobs that you are interested in having, you have the tools to convince employers that you are a viable candidate for the job with your resume, cover letter, and interviewing.

SPENDING TIME
DOING A SERIOUS
EVALUATION OF
YOUR KNOWLEDGE
AND SKILLS IS
IMPERATIVE BEFORE
YOU WRITE A
RESUME AND BEGIN
APPLYING FOR JOBS.

The Missing Link – Tool #4: Knowing Your Skills

In order to stand out among a pool of applicants, you must be able to accurately and competitively represent yourself on paper (in a resume and cover letter) and in person (in networking environments and in interviews). This means that you have to figure out who you are and what you know. Physics majors have a lot of unique knowledge and skills that are valuable in the job market. Your set of knowledge and skills develops over the course of your education in several ways:

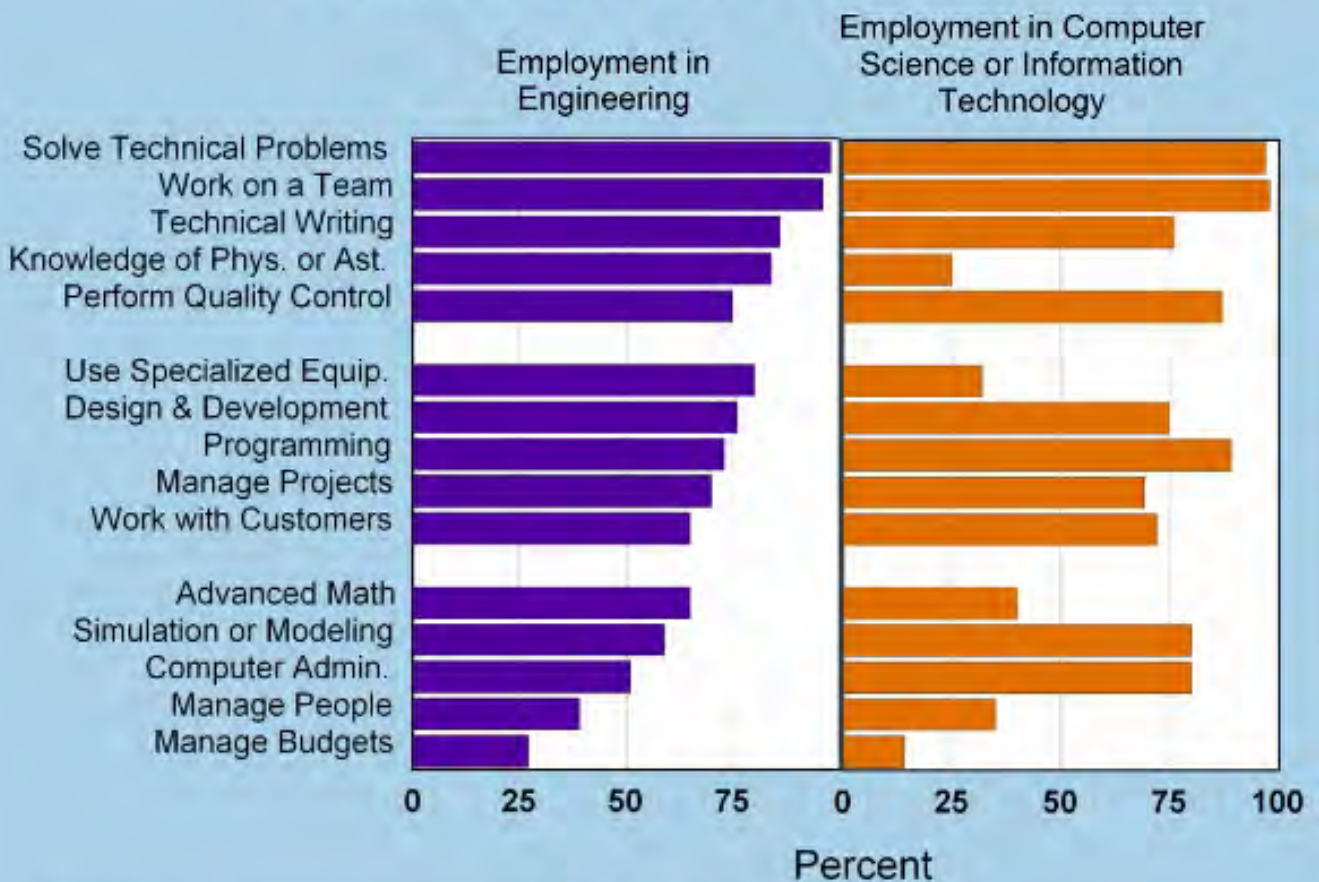
- Successful completion of introductory and advanced theoretical courses
- Successful completion of introductory and advanced lab courses
- Successful completion of an internship or research experience
- Participation in extracurricular activities
- Participation in leadership roles

Each of these curricular or extracurricular components contributes something different to your set of knowledge and skills.

The graph on the following page represents a set of knowledge and skills that is regularly used by students who have graduated with a degree in physics, reported by the graduates themselves through an AIP Statistical Research Center survey of employed bachelor's degree recipients.³



Knowledge and Skills Regularly Used by Physics Bachelor's Employed in the Private Sector, Classes of 2009 & 2010 Combined



Percentages represent the physics bachelor's who chose "daily", "weekly", or "monthly" on a four-point scale that also included "never or rarely".

<http://www.aip.org/statistics>

Figure 6: Recent data listing skills commonly used by physics bachelor's in the workplace.

Common Skills of Physics Students

The first step in assessing your skills is to consider broad categories of skills that physics students commonly develop and how to express them in language that is meaningful to employers. Below are several broad categories of skills that are developed through the experiences of a typical physics student (courses, labs, work, research, etc.).

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. That is 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.

Skill: Working with laboratory instruments

one of the common features of programs studied in the career pathways project was the availability of varied and high-quality lab courses for undergraduates.

Students who are pursuing a major in physics often have a wide variety of lab experience. 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. Some physics departments have labs during the 2nd and 3rd years as well. In addition, many students participate in research experiences that deal extensively with lab equipment. 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 skills and knowledge, including research design, data analysis, creative thinking, critical thinking, error analysis, and complex problem solving. An often overlooked skill developed through conducting research is the ability to find, read, analyze, and interpret relevant background information. This is useful in a wide variety of settings.

one of the common features of programs studied in the career pathways project was the availability of research opportunities for undergraduates.

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 to run equipment and take data, or build specialized interfaces for this purpose.

Skill: Communicating complex ideas

One of the common features of programs studied in the career pathways project was the inclusion of communication skills in the undergraduate physics curriculum.

All students are expected to develop good written and oral communication skills during their four years of college. Physics students are no exception, and they tend to have a lot of experience presenting complex information or ideas. Beyond the general education requirements, physics students usually develop enhanced **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 work in a professional journal or to write about science for a nontechnical audience, e.g., a school newspaper. **Oral communication skills** are developed when students have to present their research/class work in an oral 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 math to a variety of real world problems. When seeking employment in a STEM field, this is 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 seeking possible solutions. The quantitative physics intuition students possess is developed over years of physics coursework and endless hours of homework. Related to this, the ability to analyze information and determine what is and is not relevant is developed over years of lab work and problem solving.

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.

Skill: Problem solving and critical thinking

Underlying many of these other skills is the ability to solve problems—the ability to examine a situation, identify problems, and think creatively about a solution. Physics students do this again and again in labs, research, and homework. They learn how to find solutions through literature searches, 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.

Summary: Commonly used skills

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
- ⇒ Conducting research
- ⇒ Proficiency with computer hardware and software

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.

Exercise - Tool #4 – Part 1: Assessing Your Skills – Brainstorming your experiences

⇒ The first step is to list your experiences that may have some relevance in a job. Start broadly. You might think of all the science courses you have taken, laboratory courses that you have taken, any work experience (whether paid or volunteer), leadership experiences, events sponsored by organizations in which you have been actively involved...and many others.

My Experiences

My classes / training / workshops/ tutorials	My leadership experiences/group activities/ professional associations
My jobs: research experiences, internships, volunteer work	My hobbies and other activities

EXERCISE#4

Exercise - Tool #4 – Part 2: Assessing Your Skills – Identifying skill sets from your experiences

- ⇒ Next, think about those experiences as you review the list of skills (from the commonly used skills, page). 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 appear prevalently among your collection of experiences. For example, if much of your coursework, lab work, and your 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”
- ⇒ 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” (below). 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 question answer.
- ⇒ Note: You may need to repeat this process several times, until you have a well-honed bullet point list of 8–12 unique skills. Again, 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.
- ⇒ After completing several skills identification worksheets, summarize your bullet points and stories on the page labeled “My Skills Summary.” These summaries will be invaluable when you sit down to write your resume, write cover letters, and prepare for interviews.

Skills Assessment Activity Guidelines

1

Carefully examine your experiences. Identify one of the commonly used skills that appears in your experiences. Write this skill at the top of the "Identifying My Skills" page:

- ⇒ working with laboratory equipment
- ⇒ conducting research
- ⇒ communicating complex ideas
- ⇒ proficiency with computer hardware and software
- ⇒ analysis and quantitative thinking
- ⇒ working with others
- ⇒ problem solving
- ⇒ critical thinking

2

Back to the brainstormed list of experiences.

- ⇒ Now, regroup.
- ⇒ Use your list to write down all your experiences related to the skill. Include all the experiences that contribute to the development of this skill.
- ⇒ Consider classes, REU or internship experiences, summer jobs, teaching or research assistant experiences, club activities, outreach experiences, related hobbies.

3

Narrow it down. Draft a bullet point related to this skill like one you might use on a resume

- ⇒ Keep this short and to the point

4

Refine the language.

Refine 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.

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

5

Tell it.

Write down a few specific anecdotes that demonstrate your experiences related to this skill.

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...

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

Skill category: _____

Back to my brainstorming: Reorganizing my experiences related to this skill category

Tell it: Draft a bullet point related to this skill

Refine the language: Refine 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 experiences related to this skill

Identifying My Skills – An Assessment Worksheet

Skill category: _____

Back to my brainstorming: Reorganizing my experiences related to this skill category

Tell it: Draft a bullet point related to this skill

Refine the language: Refine 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 experiences related to this skill

My Skills Summary

⇒ List your “Tell it” bullet points below

⇒ List your “Show it” stories below

Section 3: Getting to Work

Getting to Work – Tool #5: Effective Job Searching

How can you stand out among all other job applicants? Many people think that this means having a stellar resume, cover letter, and interview. While a solid resume, cover letter, and interview experience are essential, it is hard to write a resume and cover letter that stand out if you do not know the specifics of the job to which you are applying. In addition, in order to apply for the position that you want, you have to find it first! Effective job searching concentrates your time on jobs that fit you and match your skills. Fewer, well-thought-out applications are likely to yield better results than hundreds of copies of a generic application sent to as many companies!

The online job search

Don't search for "physics"!

Physics students usually start their job search by entering the word "physics" when exploring large job databases, and 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 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.

Go back to the list of common job titles—before you start!

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.

SPS Jobs

<http://jobs.spsnational.org>

SPS Jobs is part of the American Institute of Physics Career Network and has hundreds of 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), and other federal agencies are posted on USAJobs.

Science Careers

<http://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

<http://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 <https://www.aftercollege.com/organizations/ieee-entry-level-jobs/>.

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 sectors (healthcare, for example) or may be more broad. 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 their skills in ways that are 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 #6) that you are a great candidate. Even before you are ready to begin applying, however, 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. The following story illustrates many useful tips for attending a job fair.

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 enlightening experience and can give you the opportunity to practice your elevator speech (tool #3), 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 hosts 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.

Networking

A third way that many people find employment is through taking advantage of their network (tool #3). Your faculty members, colleagues, family, friends, LinkedIn contacts, career professionals on campus, contacts from professional society meetings, and other people that have become part of your network are excellent resources when it comes to job searching. Do not be afraid to tell everyone that you meet that you are looking for 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.

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 the qualifications. 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 relevant job experience” and you are a new graduate, you may still be considered if you highlight the relevant experience you have gained while in school in your cover letter and resume.
 - If a job qualification lists “engineering degree” and you have a physics degree, you may still be considered if in your cover letter and resume you highlight how well your physics degree prepared you for an engineering position.
- In other cases, 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.
- Explore the company through online searches and see whether their mission and reputation align with your interests and ambitions.
- 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.

Exercise - Tool #5: Effective Job Searching

EXERCISE #5

⇒ Carry over the job titles you are most interested in from the bottom of exercise 1.

Job titles worth learning more about:

⇒ Choose a few online job databases 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?*

⇒ 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?

Getting to Work – Tool #6: 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 intimidating, but there is good news! If you have already gone through the "**Identifying Your Skills**" exercise, 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.

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 **the knowledge and skills relevant to the specific job** for which you are applying. Other important areas include your work experience and educational background.

Warning: 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.

Notes on resume style and length

No two resumes are the same, and 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 different components?

For more specific guidance on the exact components that should be included in your resume, formatting, and style, visit your school's career services professionals.

Many experts think that the resume for a 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, 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**. Use vertical space effectively to help the resume look more appealing visually if it does go longer than one page.

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

TOOL #6: PUTTING YOU ON THE RESUME

Suggested sections on the resume

Knowledge and skills

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 #7).

Due to the rigor and expectations of earning a degree in physics, many students in physics have few relevant work experiences to describe, so the knowledge and skills section should probably be the focal point of the resume.

Work experiences

Include any work-related experiences (jobs, internships, research), ordering those that may be relevant to this specific job ahead of those that are not. Each work experience should be accompanied by a brief statement highlighting specific accomplishments or tasks. Whenever possible, choose accomplishments or tasks that align with the description of the position you are applying for. Jobs that may at first appear unrelated (working at a fast food chain) may be excellent examples of your leadership or problem-solving experience, so spend some time writing thoughtful descriptions of your work 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.

Educational background

List where and when you got your high school diploma* and bachelor's degree (or your expected graduation date), as well as any technical and online training courses you have completed. This might include certifications in software, safety, or other relevant areas. 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.

In most cases it is not necessary to include your GPA. If your GPA is above 3.0, you should 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.

New graduates often include a brief "Relevant Coursework" section on their resume as a way to demonstrate knowledge or familiarity with a concept or idea highlighted in the job description if they do not have any hands-on experience yet. In some cases it may be useful to list the authors of the textbooks used, but only when the employer is likely to be very familiar with the authors (for example, when applying for academic jobs). Depending on the position to which you are applying, a "Relevant Coursework" section may or may not make sense to include.

Note: Because of the importance of getting the hiring manager's attention quickly, you may choose to put your educational background information at the end of your resume. What is most important is that this person *immediately* sees that you have the same skills that are included in the job description.

*Note that typically, high school education is dropped from a resume by the end of the second year/beginning of the third.

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 relevant hobbies.

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 "proficient" when their skill level is merely adequate or less, i.e., they got a "C" in a computer science course. While bolstering 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. "Two semesters of C++" is much more meaningful than "proficient" or "adequate." Even more meaningful would be something like, "Daily use of LabVIEW to take materials characterization data for 10-week research project."

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 or a letter of reference. Before you list anyone as a reference, ask permission. It is a good idea to provide all of your references with a copy of your resume (specific for the job to which you are applying) and information about the company to which you are applying, including 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 "ask" 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.

Exercise - Tool #6: Building the “Knowledge and Skills” Section of Your Resume

⇒ **This exercise should be done for each job!**

⇒ Carry over a position description and the relevant key words from exercise #5. Choose one that aligns well with your skills, abilities, and interests and complete the first two columns below

EXERCISE #6

Key words or phrases describing what the company is looking for in a candidate (from exercise #5)	My related “Tell it” bullet points (from exercise #4) (If you don’t have one for this key word or phrase, create one following the guidance in exercise #4 or, if it does not apply to you, leave this space blank.)	Priority
Key words or phrases describing the responsibilities of the position (from exercise #5)	My related “Tell it” bullet points (from exercise #4) (If you don’t have one for this key word or phrase, create one following the guidance in exercise #4 or, if it does not apply to you, leave this space blank.)	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.

⇒ 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 “Knowledge and Skills” section of your resume is 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 resume specific to each job. The hard work of writing the bullet points in exercise #5 sets you up to easily create different resumes targeted for each position that interests you.

Getting to Work – Tool #7: Writing an Effective Cover Letter

The cover letter that accompanies your resume is an important part of a job application. It is often the way employers decide between the “Interesting People” pile and the “Forget About It” pile. The cover letter is the first opportunity an applicant has to engage a prospective employer. *Always* send one along with your resume when applying for a job, *even if it is not requested in the ad*.

Cover letter basics⁴

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, then the cover letter could be slightly longer than one page, 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.

The 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 any employees you know, but only with their permission. Indicate your interest in the position in the opening paragraph. This is where you show enthusiasm and interest!

The 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 ad.

The closing

This paragraph should also be brief. Thank the employer for considering your application and let him or her 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. It is fine to say that you are excited by the prospect of this position and reiterate your 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 equivalent is appropriate. “Dear Sirs” is not appreciated by many female managers.

Do your research

- ⇒ Read the position advertisement and carefully identify job requirements (e.g., knowledge and experience) and keywords. Search the Internet for additional information about the job position, the division, and the company to which you are applying.
- ⇒ Sell yourself. Connect the requirements in the job ad with your experiences, skills, knowledge, and background. In short, highlight phrases from your resume for the employer that match the job description or stated requirements. Give specific examples of your experiences and abilities.
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 promoted to manager within six months of starting at ____."

Demonstrate your ability to write well

The cover letter is a professional letter; however, it need not be a dull letter. 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 about what excites you, but focus on what excites you that also benefits the company.

Exercise - Tool #7: Building the “Middle” Paragraph(s) of Your Cover Letter

EXERCISE #7

- ⇒ For the same position description you used in exercise #6, carry over the top five relevant key words or phrases. Then complete the second column.

Top 5 priority key words or phrases	My related “Show it” stories (from exercise #4) (If you don’t have one for this key word or phrase, create one following the guidance in exercise #4 or, if it does not apply to you, leave this space blank.)

- ⇒ 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.
- ⇒ With the job advertisement in one hand, the results of exercise #6 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.

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 to complete the box below, 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 and abilities?
- ⇒ After receiving feedback, draft a second version of the middle section of your cover letter.

Draft 2 of middle section of cover letter

Standing Out – Tool #8: Acing the Interview

If you have followed all the advice and tips in this toolbox, we would like to think that you should get an interview. But the truth is, 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 from veterans higher than from civilians), how long the position has been posted, and maybe even the weather. However, by following best practices and preparing thoughtful and targeted resumes and cover letters for positions that really would be a good fit 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 you and for the organization. The employer is selling the job to you, and you elaborate 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
- Your communication (written and verbal) skills
- Your interpersonal and relationship-building skills
- Your leadership qualities
- Your organizational and planning skills
- Your problem-solving and analytical skills
- Your work ethic, maturity, and determination

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

Preparing for an interview

Adequate and professional preparation is fundamental for mastering a job interview. In order 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. Know about the person who will conduct the interviewing.

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 so that you are already familiar with what they and the division do. Employer research is essential prior to the interviewing process. 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.

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. 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 preparation 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.

Example: Some common interview questions

- ⇒ Why are you interested in this job?
- ⇒ What is your greatest strength?

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

Example: 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.

After doing your 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).

Some physics graduates report being asked physics-based content questions to assess their knowledge, some interviews include puzzle questions like “*How would you move Mount Fuji?*”, and others include skills tests or writing samples. A great way to find out what to expect 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!

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 might bring to the team if you have a particularly insightful question. Below are some possible question topics:

- Extent to which you would work independently or as a member of a group
- The top priorities for the position
- What the interviewer enjoys most about working at the company
- Recent project that the team has been working on
- The typical work day start and end times
- How often you would have the opportunity to travel to other locations (only if travel is in the job description)
- Possibilities for advancement within the company over time
- The opportunity for training

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.

Special tips for phone interviews⁵

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

1. Do your homework.

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

2. Find a suitable interviewing place.

Find an appropriate interviewing location that is quiet and free of distractions. Also, if you need to be on a cell phone, 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, as well as paper and pen to take notes, and a glass of water.^[1]

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 business attire

and having 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 he/she 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 he or she 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.

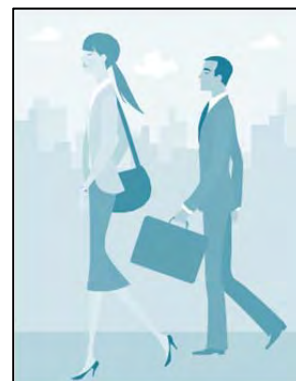
In retrospect, I wish I was more professionally prepared and informed about what sort of questions to expect. I feel more confident now that I know how to be better prepared, what to do and not to do, and what/who to research. I encourage you to take phone interviews very seriously, do adequate investigation,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

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

More tips for face-to-face interviews⁶

1. Dress professionally for your potential job title.

Knowing how to dress appropriately for a job interview can be a challenge for physics students who have spent the past four years in a student lounge doing homework or in a lab doing experiments. If you do not have clothing for an interview, consider making an investment purchase of an “interview outfit.” If that is not an option, consider borrowing a set of clothing from a friend or relative. Some career offices 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.

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.

Table 2: General guidelines for “what to wear”

- ⇒ Jeans, t-shirts, athletic shoes, and flip-flops are generally not appropriate for any interview situation.
- ⇒ 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.
- ⇒ For men, dress slacks with a belt and a shirt with a collar are the minimum expectations. For women, slacks, skirts, or dresses are appropriate. The range is from formal business attire to casual business attire.
- ⇒ Business casual is not the same as just casual.
- ⇒ In general, dress conservatively.
- ⇒ Be sure that whatever you select is clean and wrinkle-free.

If you are not sure about your attire, consult with someone who has a job like the one for which you are interviewing; sometimes faculty members may not be your best resource for 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.

Exercise - Tool #8: Preparing for an Interview

The best preparation for an interview is practice! You have already identified your skills (your “Tell it” bullet points) and listed some of your experiences (your “Share 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 these questions, 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 #3!).
- ⇒ Why are you interested in this position (and/or working for this company/organization)?
- ⇒ What would you bring to this position?

Behavioral 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 made a mistake? How did you handle it?
- ⇒ Give an example of how you worked on a team.
- ⇒ What do you do if you disagree with someone at work?

Personality / Work Habits Questions

- ⇒ What are your strengths and weaknesses?
- ⇒ How would your friends describe you?

- ⇒ What type of work environment do you prefer?
- ⇒ What are some of your short- and long-term goals?
- ⇒ What tools or habits do you use to keep organized?

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 your career professionals on campus as well!

Section 4: Career Preparation and Your Department

Affecting Change in Your Department/Program

Physics departments in general do a good job of preparing students for graduate school. If they have followed a primarily 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 well 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."⁷

Common features

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.

The features are shown on the following page.

Action items – Ways for students to have influence in the department

Some specific examples related to the student tools presented in this toolbox are presented here.

- Talk to faculty and department leaders about the possibility of contacting alumni to help with mock interviews.
- Talk to faculty and department leaders about how the department supports student participation at professional meetings.
- Encourage faculty to engage undergraduate students in collaborative research.
- Encourage physics departments to offer a one- or two-credit course focusing on career decision-making and professional skill acquisition.
- Address career preparation issues at an SPS meeting, perhaps by inviting alumni to share their stories or inviting career services professionals to talk about the services they provide to students.

Curricular features

- ⇒ Varied and high-quality lab courses
- ⇒ Research opportunities for undergraduates
- ⇒ Curricular flexibility
- ⇒ Communication skills as part of the undergraduate physics experience

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

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 graduates with a bachelor's degree in physics 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 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, as well as the list of suggested job databases and any other information you may come across regarding career-related opportunities.
- ⇒ Visit the career office! This office is 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 a bachelor's degree in physics, resume and cover letter writing, 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 science, technology, engineering, and mathematics (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

<http://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

Check out the *Resources* section of Physics Today Jobs for information on different physics career options, resume and cover letter templates, and advice on applying for jobs.

Careers Using Physics

www.spsnational.org/cup

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/trends/states/state.html

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-bachelor's-initial-employment

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.

References

¹ NSF Award Number 1011829; Project Title: Expanding the STEM Workforce by Equipping Physics Bachelor's Degree Recipients and Their Departments to Address the Full Range of Career Options.

² Peter Fiske, *Put Your Science to Work: The Take-Charge Career Guide for Scientists*, John Wiley & Sons, 2013.

³ "Physics Bachelor's Initial Employment Data," from the degree recipient follow-up survey for the classes of 2009 and 2010, Casey Langer Tesfaye and Patrick Mulvey, <http://www.aip.org/statistics/trends/reports/empinibs0910.pdf>.

⁴ Information retrieved from: Landing Your First Job – A Guide for Physics Students, by John S. Rigden.

⁵ Several references used: [1] <http://jobsearch.about.com/cs/interviews/a/phoneinterview.htm>; [2] http://www.foxbusiness.com/personal-finance/2011/02/09/common-interviewing-mistakes-college-students-make/?cmpid=cmt_email_Gigya_Common_Interviewing_Mistakes_College_Students_Make.

⁶ www.foxbusiness.com/personal-finance/2011/02/09/common-interviewing-mistakes-college-students-make/?cmpid=cmt_email_Gigya_Common_Interviewing_Mistakes_College_Students_Make.

⁷ The full version of the SPIN-UP report can be found online here:

<http://www.aps.org/programs/education/undergrad/faculty/spinup/upload/SPIN-UP-Report.pdf>