

Questions for panel

- Why did you go to grad school?
- What excites you about the research you do? What is a typical day like?
- What is your experience with mentoring from faculty? How do you choose a good advisor?
- How are you funded?
- How to prepare for grad school? What was hard or easy about the transition?
- What are the myths and surprises in grad school?
- What was your biggest challenge? How do you handle stress and keep a work-life balance?
- PhD or MSc?
- How to figure out what to do after grad school?
- What is grad school social life like?

Advice About Graduate School

ACADEMIA

PRO

YOU CAN WORK WHENEVER
YOU WANT! EVERY DAY
IS A SATURDAY!



CON

YOU WORK ON SATURDAYS.



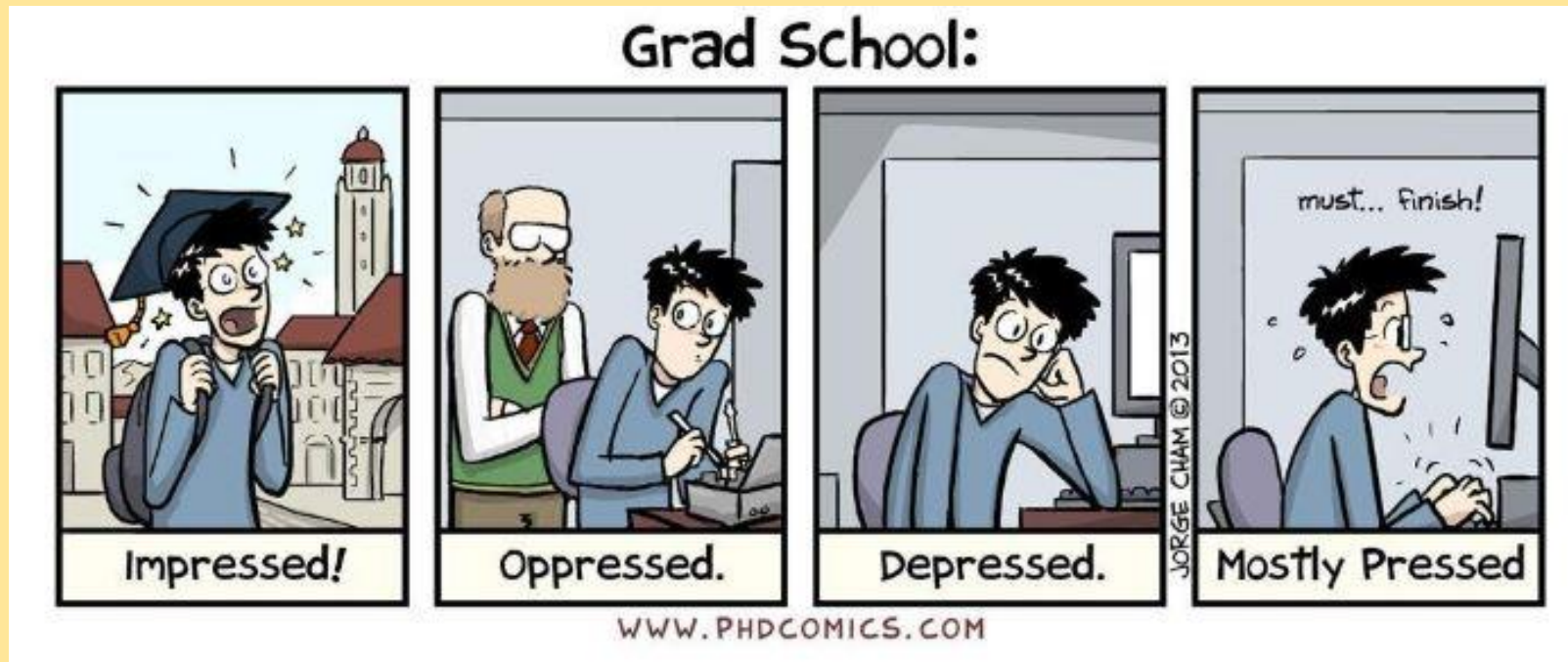
JORGE CHAM © 2017

WWW.PHDCOMICS.COM

Outline

- Why should I go to grad school?
- What is grad school?
- How do I apply for grad school?
- What happens after grad school?
- Summer research!

Why should I go to grad school?





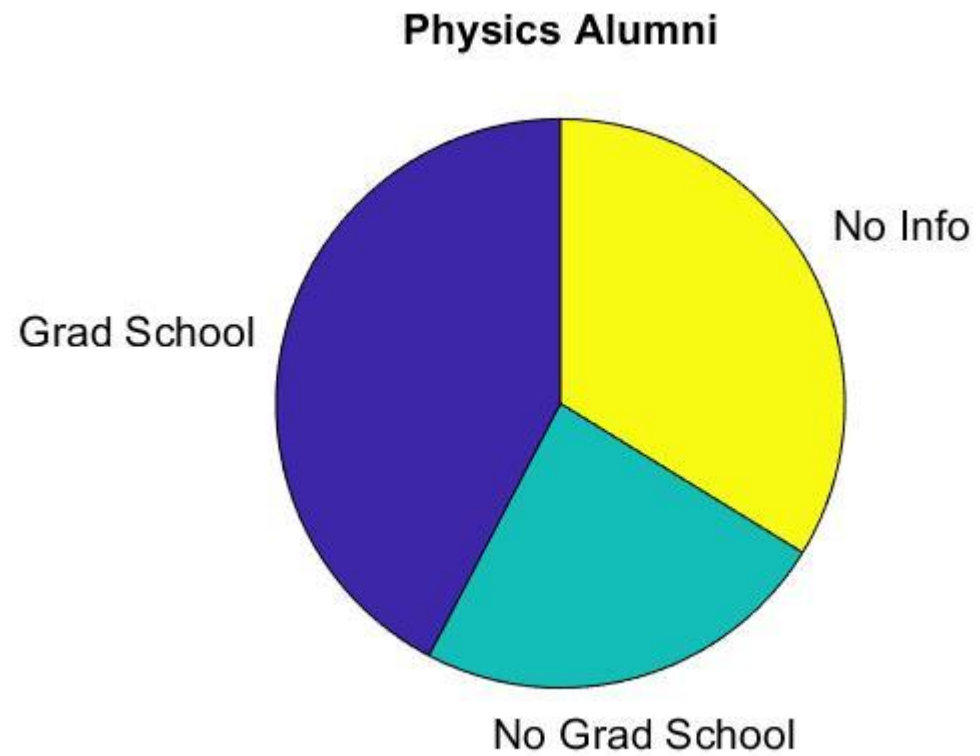
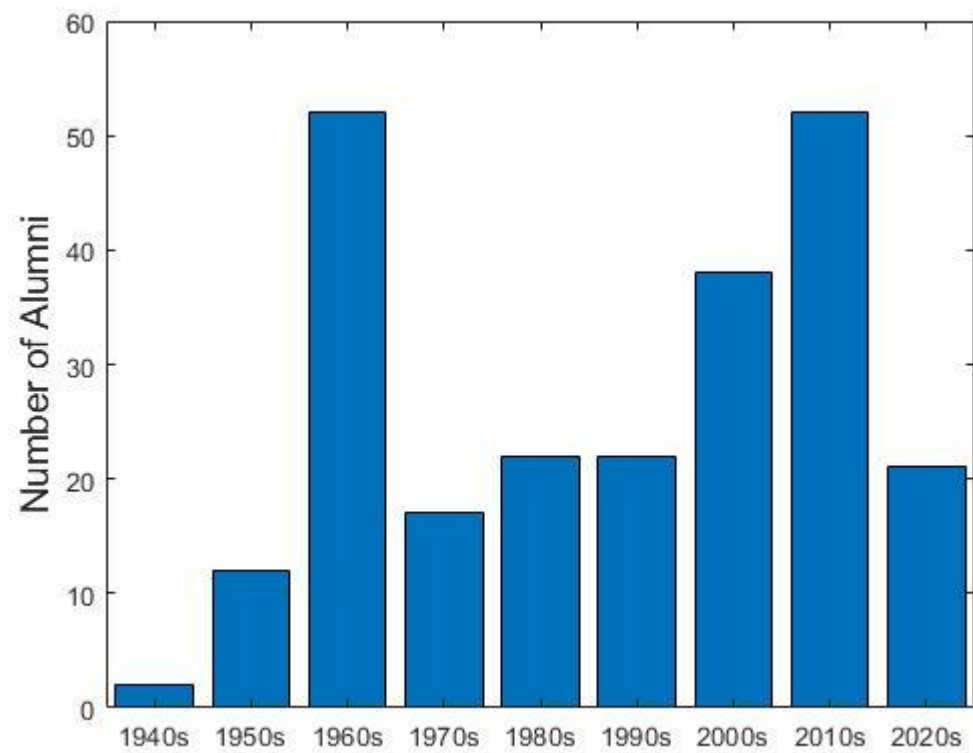
Northeastern University

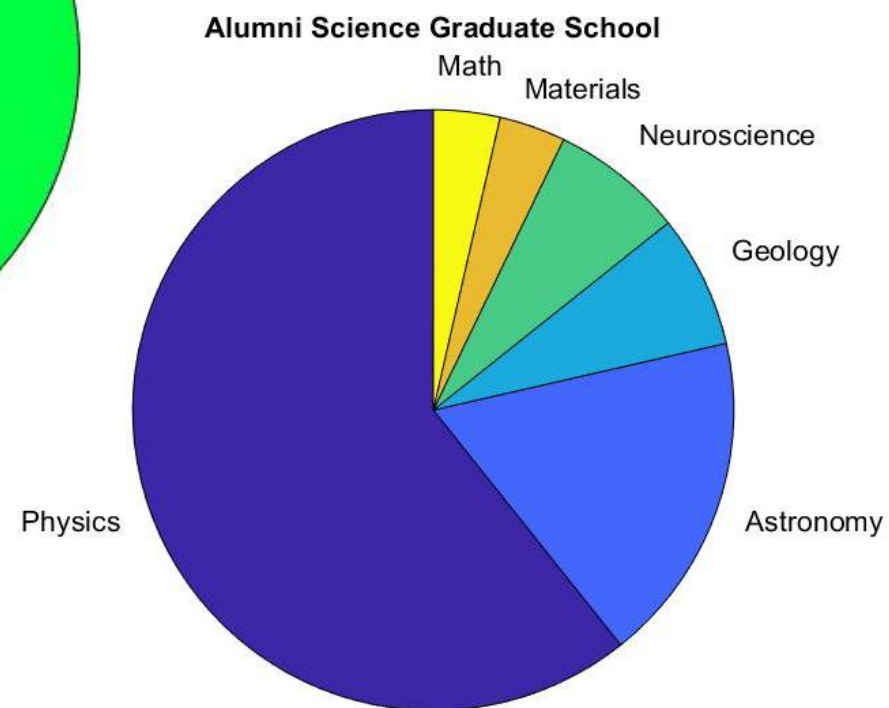
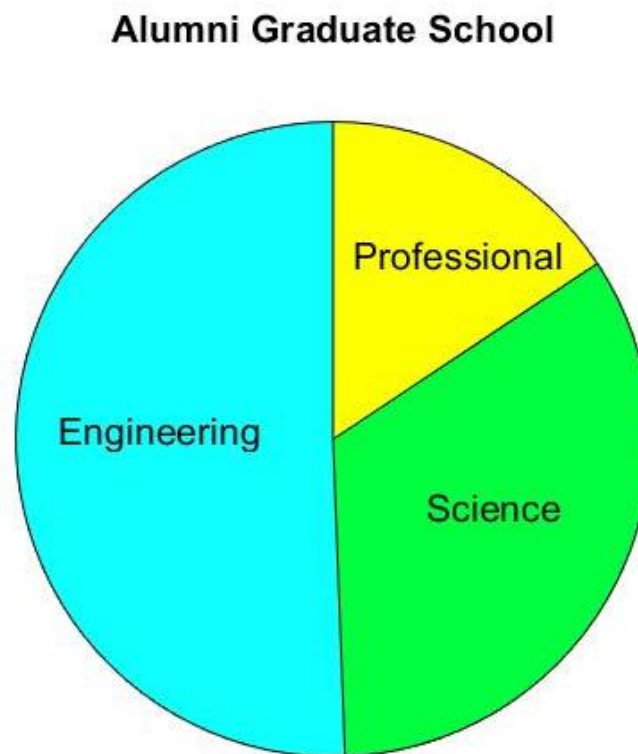
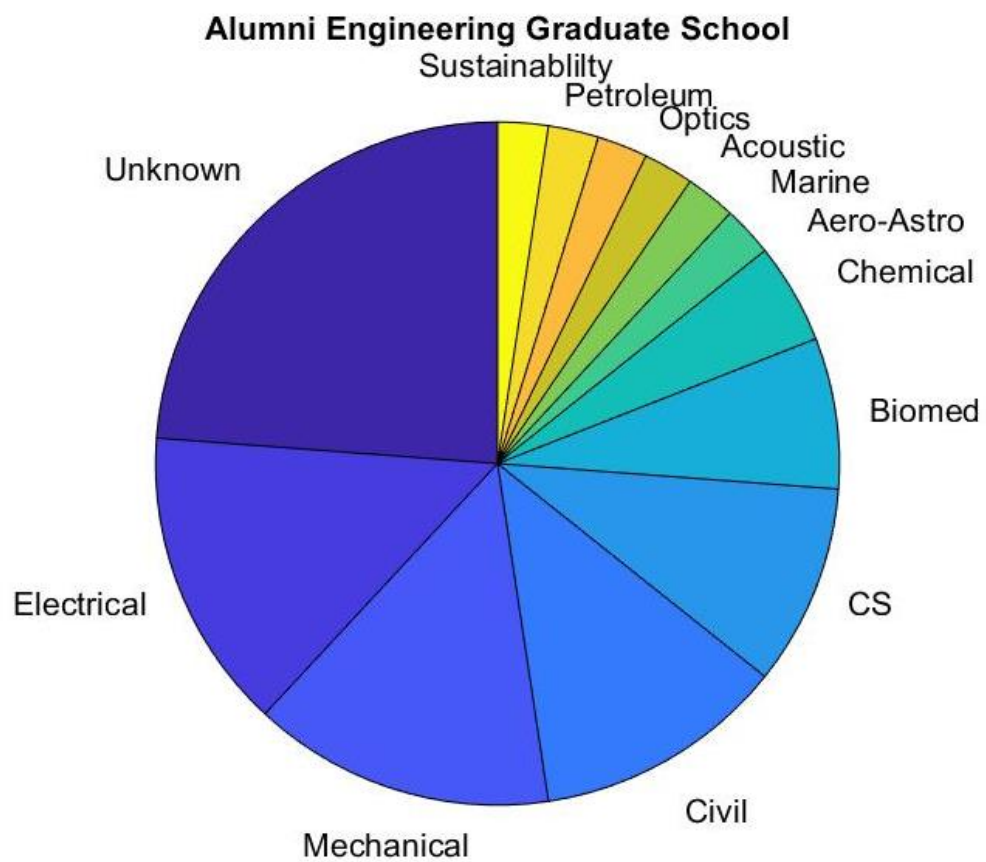
Education Pays

Median Earnings	Average: \$65,262	Unemployment Rate	Average: 4.25%
Doctorate Degree	1.5%	<div><div></div><div></div></div>	\$99,290
Professional Degree	1.8%	<div><div></div><div></div></div>	\$100,060
Master's Degree	2.6%	<div><div></div><div></div></div>	\$81,867
Bachelor's Degree	3.5%	<div><div></div><div></div></div>	\$69,381
Associate Degree	4.6%	<div><div></div><div></div></div>	\$50,093
Some College but No Degree	5.5%	<div><div></div><div></div></div>	\$46,755
High School Diploma	6.2%	<div><div></div><div></div></div>	\$42,081
Less Than a High School Diploma	8.3%	<div><div></div><div></div></div>	\$32,565

Source: U.S. Bureau of Labor Statistics (BLS), 2022

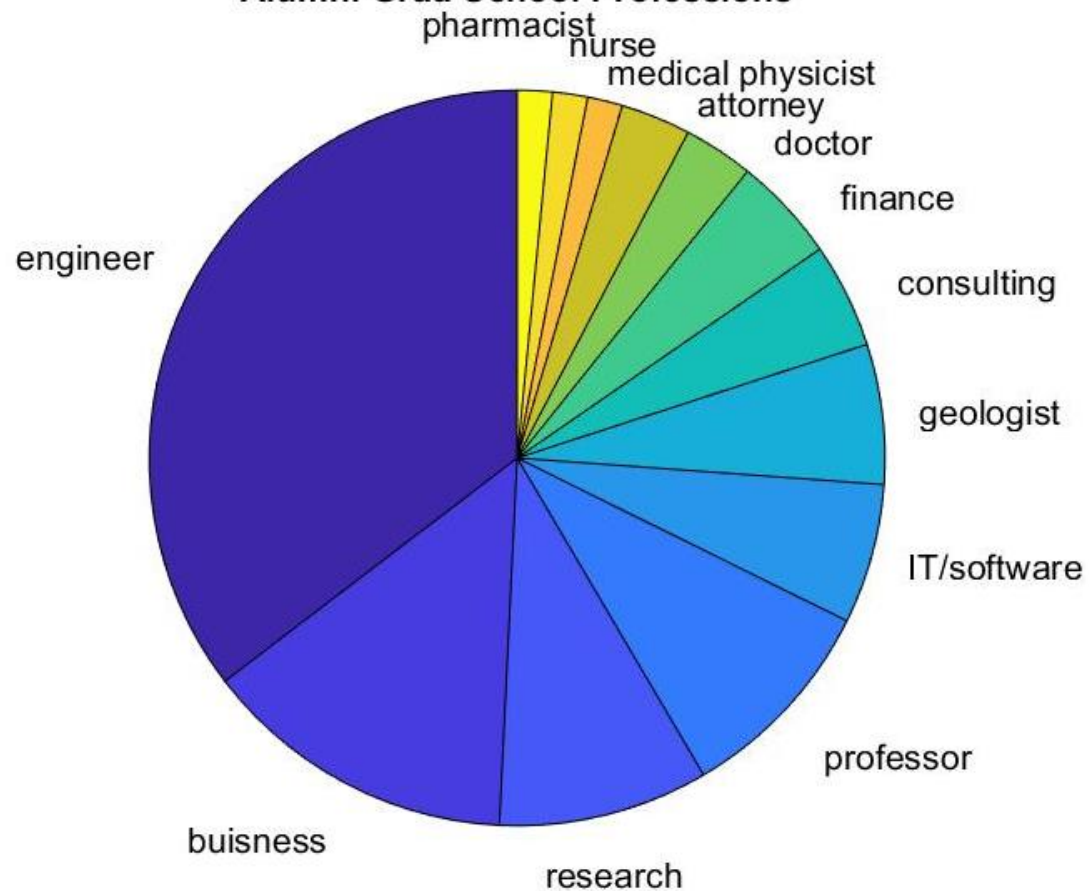
www.northeastern.edu



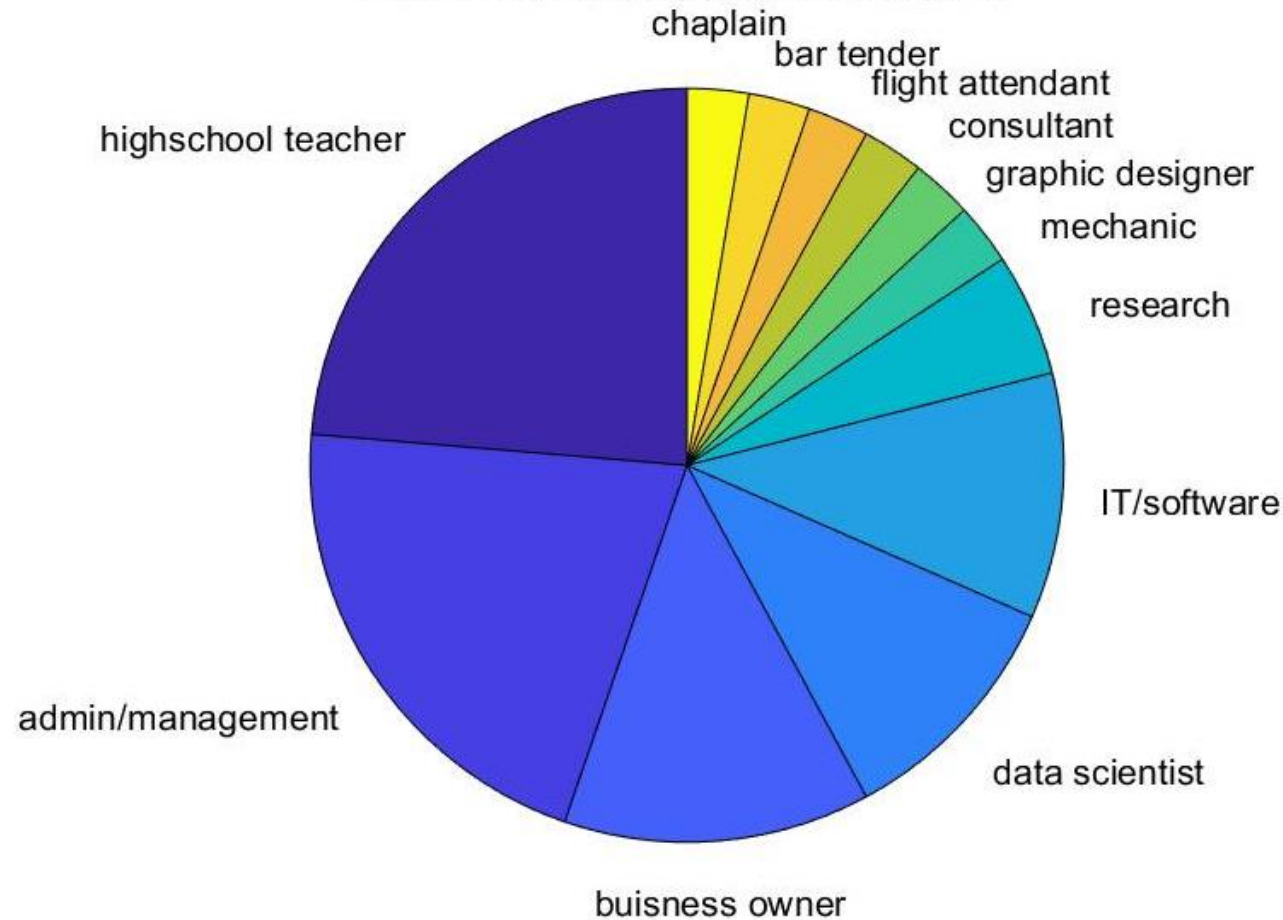


Science	Engineering	Professional
Georgia Tech	UNO (4)	U Florida (Med School)
Emory	Tulane (2)	LSU (Med School)
Columbia	USC (2)	Southern Illinois (Nursing)
Indiana U Bloomington	U Washington (2)	UCLA (MBA)
LSU	LSU	U St Thomas (MBA)
UNO	U North Dakota	Temple U (Pharmacy)
U of Exeter (UK)	U South Alabama	U Houston (MBA)
UC Santa Barbara	Penn State	
Case Western Reserve	University of Oldenburg (Germany)	
U Alabama Huntsville	Vanderbilt	
U Wisconsin	George Mason	
Tulane	Georgia Tech	
U Minnesota	U Colorado	
Georgia Tech	Manhattan College	
UT San Antonio	UT Austin	
Pittsburg U	U Louisiana Lafayette	

Alumni Grad School Professions

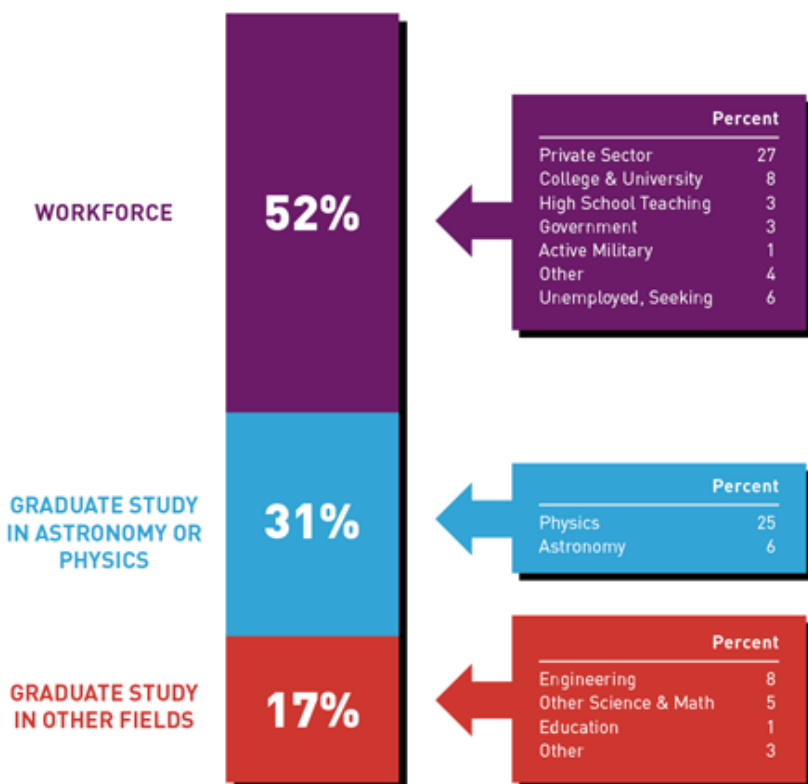


Alumni Non-Grad School Professions



Physics Bachelors 1 Year Later

9,250 Recent Degree Recipients



Note: Data in this figure are from the AIP Statistical Research Center's annual Bachelors Follow-up Survey, classes of 2019 and 2020 combined. The 9,250 degree recipients represent the average of these two classes. Two percent of respondents to the survey indicated that they had left the US to pursue employment or graduate study and are not included in the figure.

Starting Salaries in the Private Sector

Physics Degree Recipients, Classes of 2019 & 2020

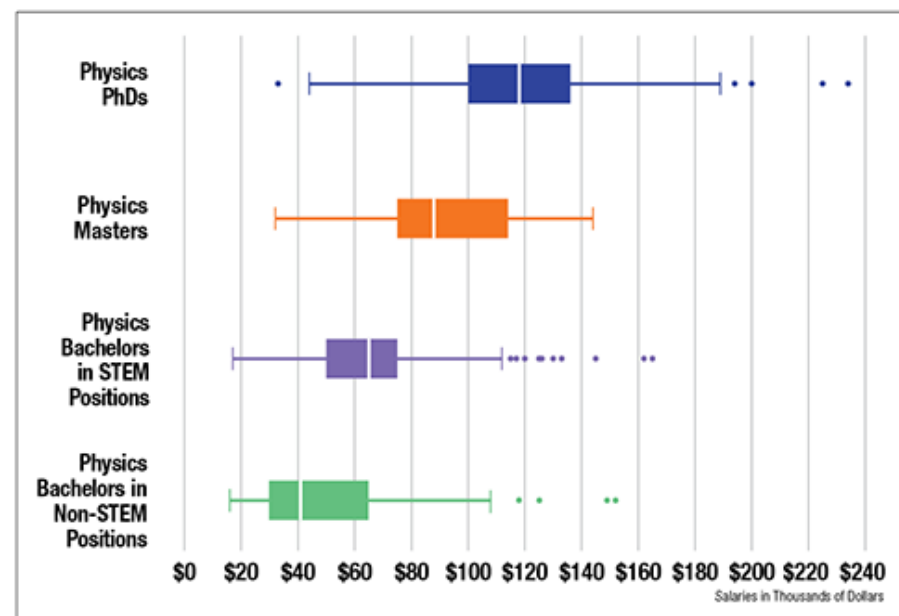


Figure includes only starting salaries for US educated physics degree recipients from the classes of 2019 and 2020 that were in full-time, newly accepted private sector positions in the US. The box represents the middle 50% (25th to 75th percentile) of the salaries. The full starting salary range, excluding outliers, is represented by the lines extending to each side of the box. The vertical line within the box represents the median salary. The dots outside the lines are statistical outliers but represent actual salaries. STEM refers to positions in science, technology, engineering, and math.

Starting Salaries for Physics Bachelors

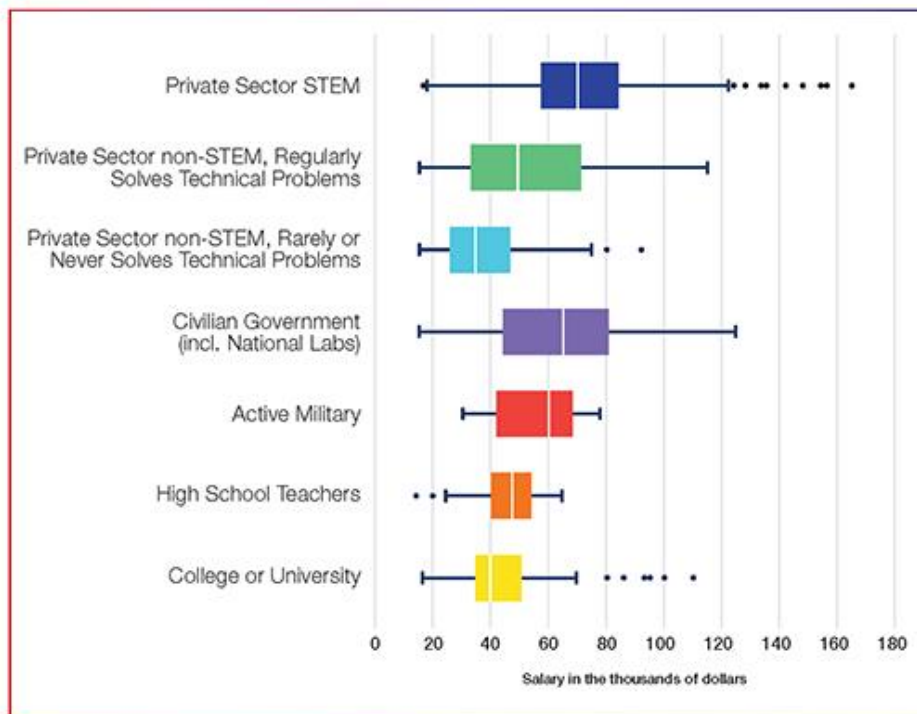


Figure only includes starting salaries for full-time employed, US-educated physics bachelor's degree recipients from the classes of 2021 and 2022 combined. The box represents the middle 50% (25th to 75th percentile) of the salaries. The vertical line within the box represents the median salary. The full starting salary range, excluding outliers, is represented by the lines extending to each side of the box. The dots outside the lines are statistical outliers but actual salaries. STEM refers to positions in science, technology, engineering, and math.

Starting Salaries for New Physics Doctorates

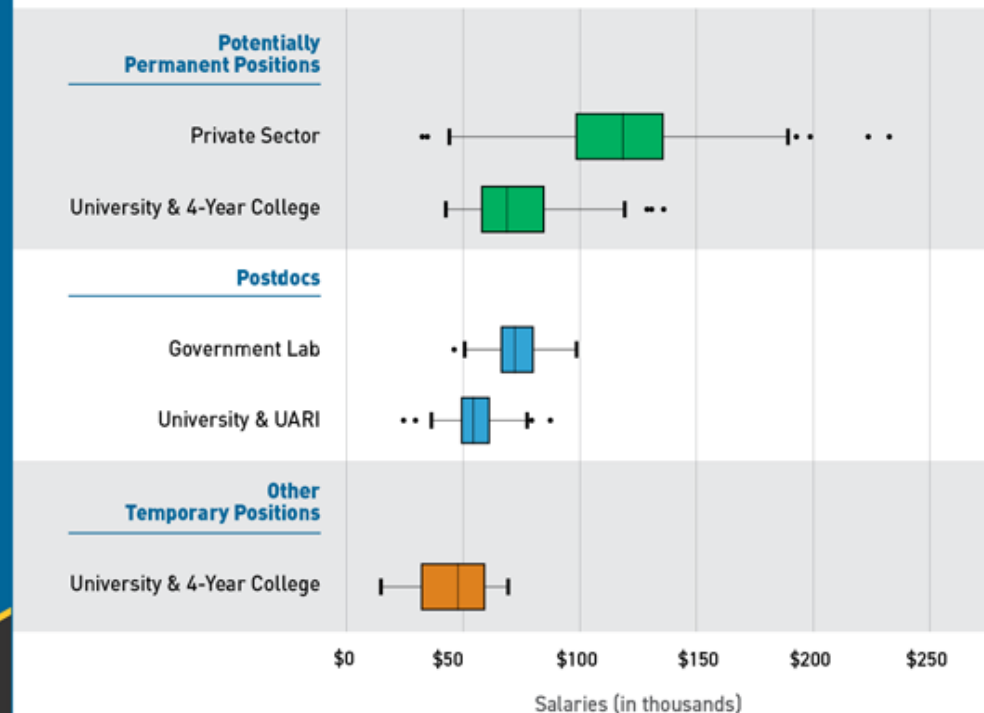
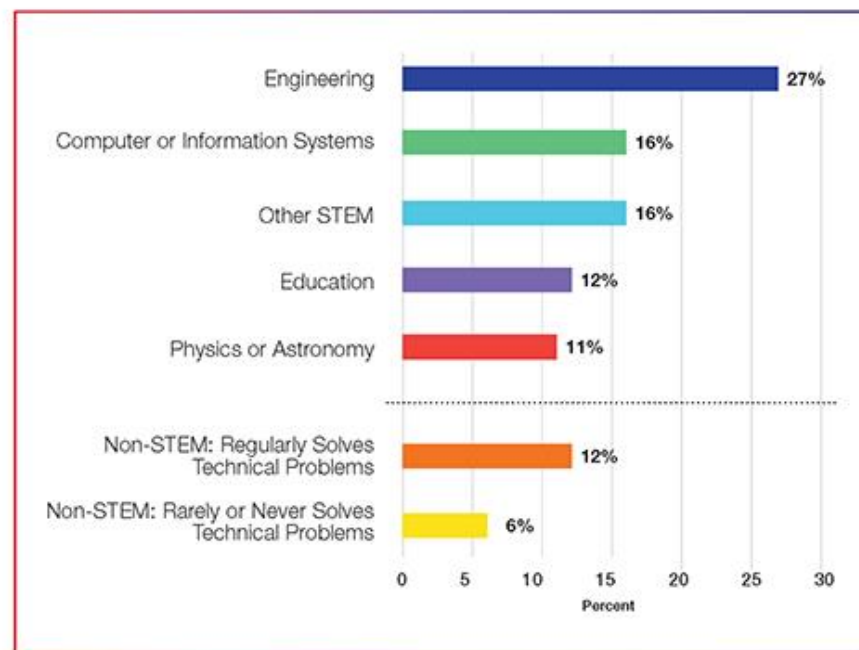


Figure includes only US educated doctorates from the classes of 2019 and 2020 combined that were in full-time, newly accepted positions in the US. The box represents the middle 50% (25th to 75th percentile) of the salaries. The full starting salary range, excluding outliers, is represented by the lines extending to each side of the box. The vertical line within the box represents the median salary. The dots outside the lines are statistical outliers but actual salaries. UARI: University Affiliated Research Institute

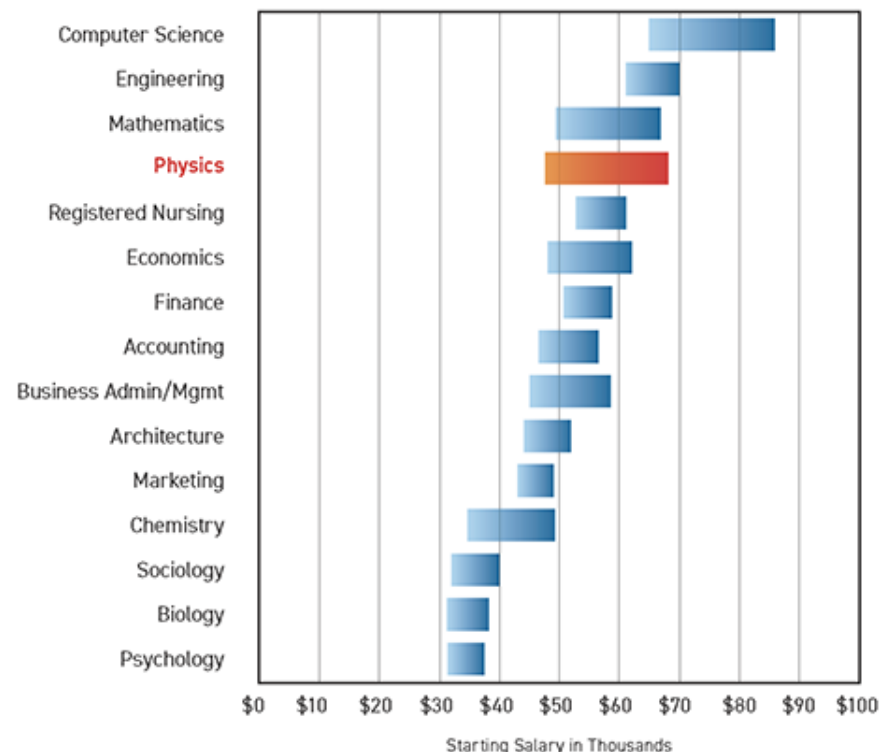
Field of Employment for New Physics Bachelors



- STEM refers to natural science, technology, engineering, and mathematics
- Regularly solves technical problems includes respondents who selected "Daily", "Weekly", or "Monthly" on a four-point scale that also included "Rarely or Never"
- Almost half of new physics bachelors were in the workforce in the winter after receiving their degree

Source: AIP Follow-up Survey of Physics Bachelors, the classes of 2021 and 2022 combined. Field of employment data is self-reported and reflects all sectors of employment.

What Do New Bachelors Earn? Starting Salaries for the Class of 2018



Bars represent the middle 50% of salaries, i.e. between the 25th and the 75th percentiles.

Reprinted from the Summer 2019 Salary Survey, with permission of the National Association of Colleges and Employers, copyright holder.

Why go to grad school?

Good Reasons to Go to Graduate School:

1. Passion for Your Field
2. Career Advancement
3. Skill Enhancement
4. Networking Opportunities
5. Research Opportunities
6. Personal Growth

Bad Reasons to Go to Graduate School:

1. Lack of Direction
2. Pressure or Expectation
3. Escape from the Job Market
4. Assuming It Guarantees a High Salary
5. Fear of Change
6. Pressure to Compete with Peers

Pros and cons of going to grad school

Pros of Going to Graduate School:

1. Specialized Knowledge
2. Career Advancement
3. Networking
4. Research Opportunities
5. Personal Growth
6. Higher Earning Potential
7. Career Switching

Cons of Going to Graduate School:

1. Financial Cost
2. Time Commitment
3. Uncertain Job Market
4. Narrow Focus
5. Work-Life Balance
6. Competitive Admission
7. Stress and Burnout
8. Opportunity Cost

What is grad school?

ALL DAY NAPPING IS ACCEPTABLE



THERE IS CONSTANT ADULT SUPERVISION



HOW GRAD SCHOOL IS JUST LIKE KINDERGARTEN

YOU GET COOKIES FOR LUNCH



MOST COMMON ACTIVITY:
CUTTING AND PASTING



THERE ARE NO GRADES
(YOU JUST HAVE TO PLAY WELL WITH OTHERS)

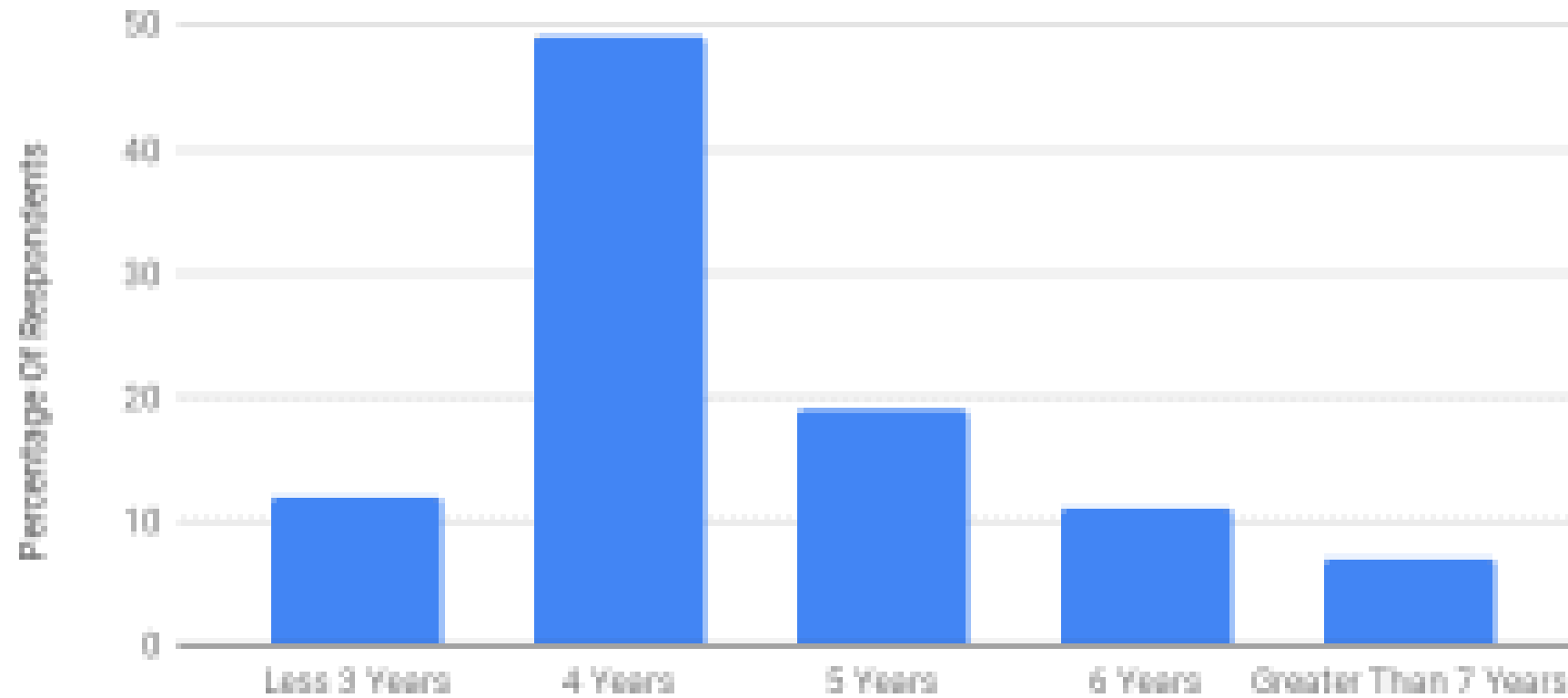


CRYING FOR YOUR MOMMY IS NORMAL



How long did it take to get your doctoral degree (or you expect it to take)?

(N=114)



Grad school timeline (typical)

1.First Year of Coursework (1st year):

- Begin your graduate program by taking required and elective courses.
- Establish a relationship with your academic advisor or research supervisor.
- Explore research interests and potential research topics.

2.Comprehensive Exams or Research Proposal (1st-2nd year):

- Depending on your program, you may need to pass comprehensive exams or propose your research project.
- Begin formulating your thesis or dissertation research plan.

3.Research and Coursework (2nd-3rd year):

- Continue coursework and engage in research or thesis/dissertation work.
- Collaborate with professors and peers on research projects.
- Present research findings at conferences if applicable.

4.Data Collection and Analysis (2nd-4th year):

- For research-based programs, collect and analyze data for your thesis or dissertation.
- Write and revise your research document with guidance from your advisor.

5.Thesis/Dissertation Defense Preparation (final year or two):

- Prepare for your thesis or dissertation defense.
- Submit your document for review and approval by your committee.

6.Thesis/Dissertation Defense (final year):

- Defend your thesis or dissertation before a committee of faculty members.
- Complete any required revisions or edits to your document.

7.Graduation (final year):

- Complete all program requirements, including coursework, exams, and research.
- Graduate and receive your master's or doctoral degree.

What is gradschool like?

- Financial support yea!
- Teaching assistantships
- Research assistantships
- Fellowships
- After you get there
- Year 1 Qualifying exams courses pick an advisor and start research
- Year 2 Research, remaining coursework Preliminary oral exam
- Year 3 n Research, Research, Research, Research
- Year n Write thesis (36 months)
- Average time to Ph.D. is 5 years, but varies by specialty

MARRIAGE vs. The Ph.D.



Marriage



Ph.D.

Typical Length:

7.5 years

7 years

Begins with:

A proposal

A thesis proposal

Culminates in a ceremony where you walk down an aisle dressed in a gown:



Usually entered into by:

Foolish young people in love

Foolish young people without a job

50% end in:

Bitter divorce

Bitter remorse

Involves exchange of:

Vows

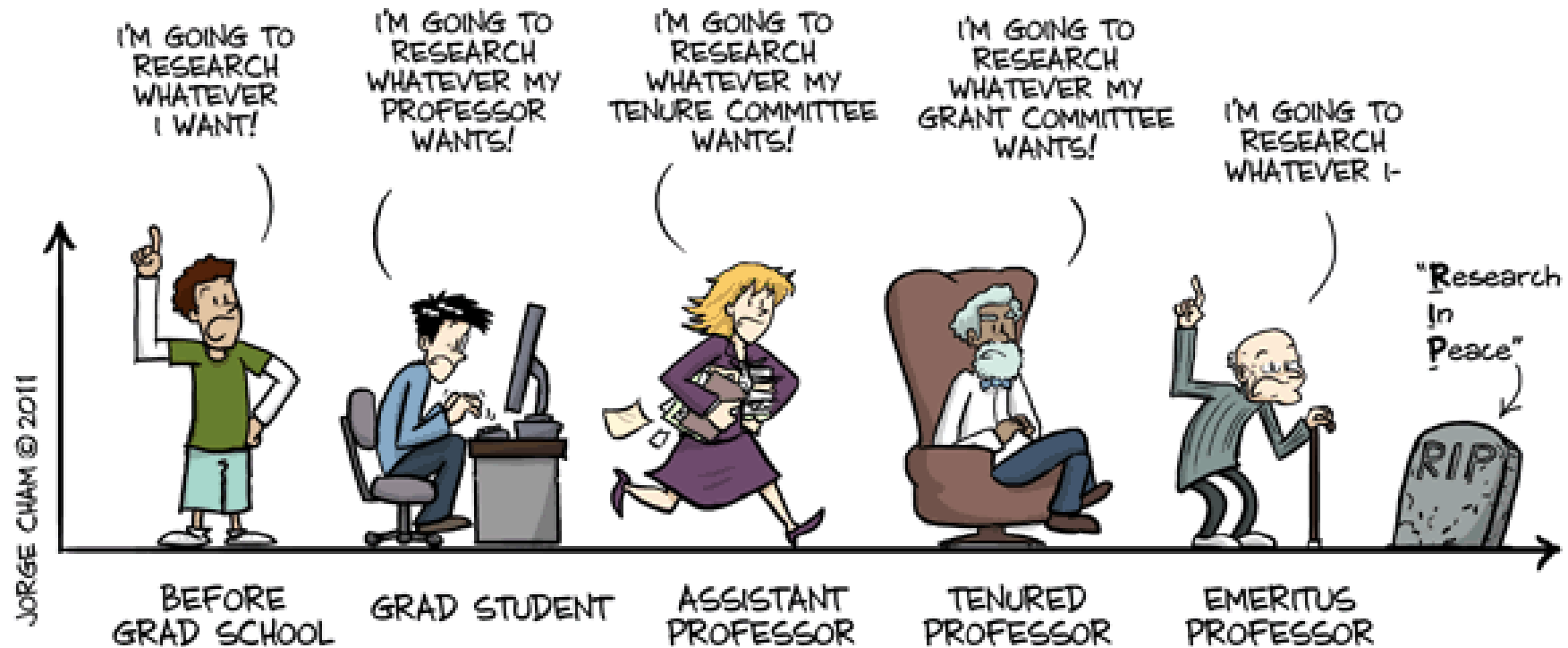
Know-how

Until death do you part?

If you're lucky

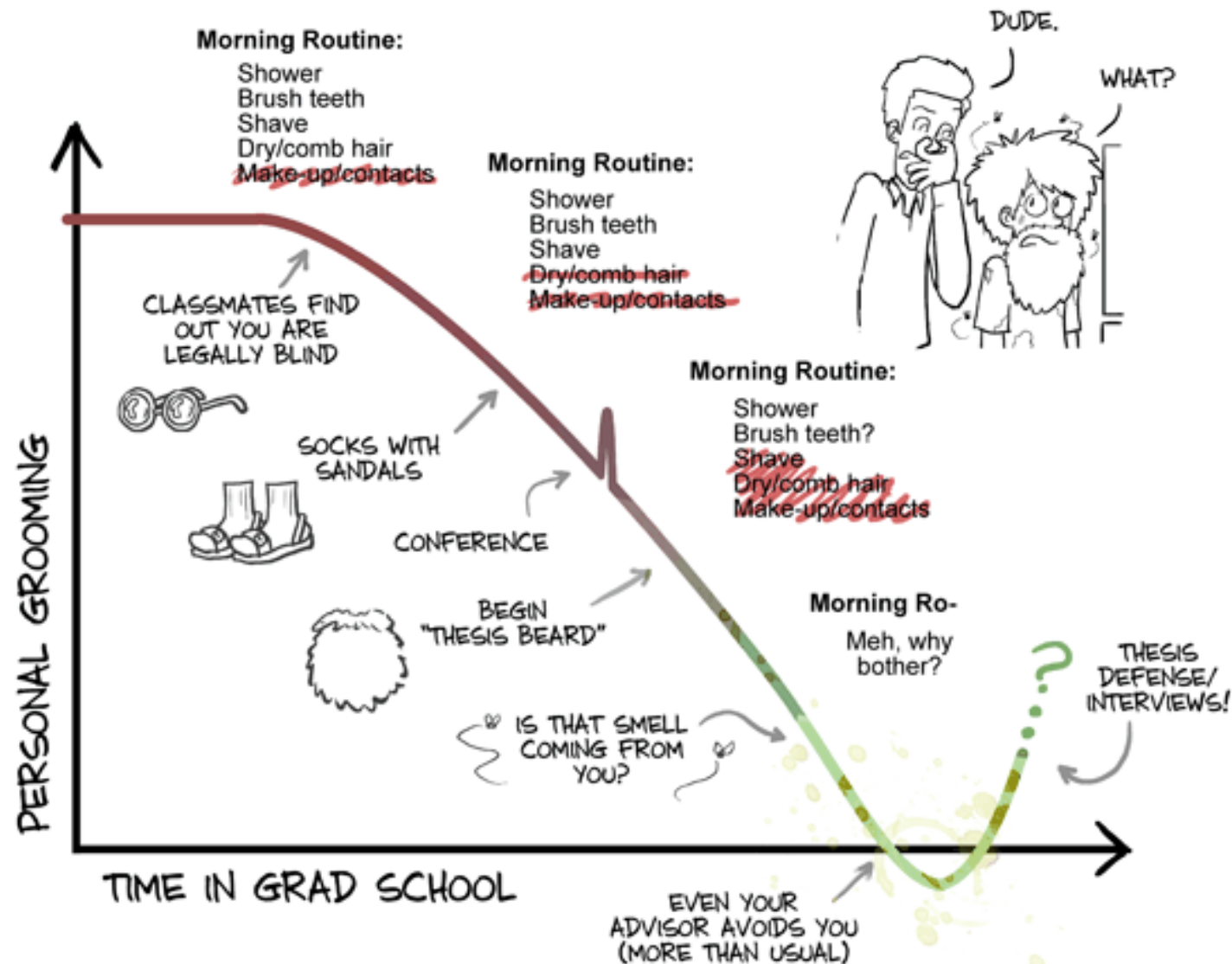
If you're lazy

THE EVOLUTION OF INTELLECTUAL FREEDOM



GROOMING VS. TIME IN GRAD SCHOOL

What happens when you realize nobody's paying attention.



Funding

Graduate school in science and Engineering is free!

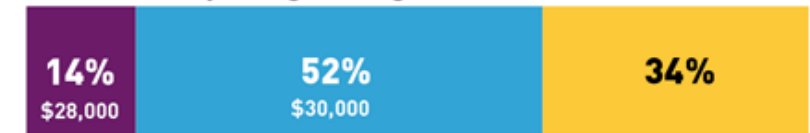
Graduate School Support

Types of Support and Median Stipends
for New Physics Bachelors Enrolled in a PhD Program

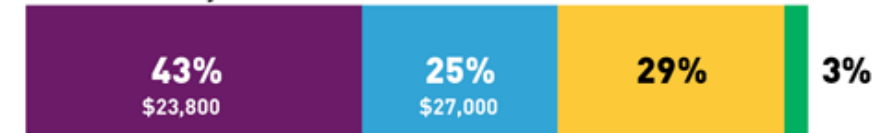
Graduate Study in Physics and Astronomy



Graduate Study in Engineering



Graduate Study in Other Fields*



Teaching Assistant Research Assistant Fellowships & Scholarships Self-funded

* Does not include professional degree fields such as law and medicine.

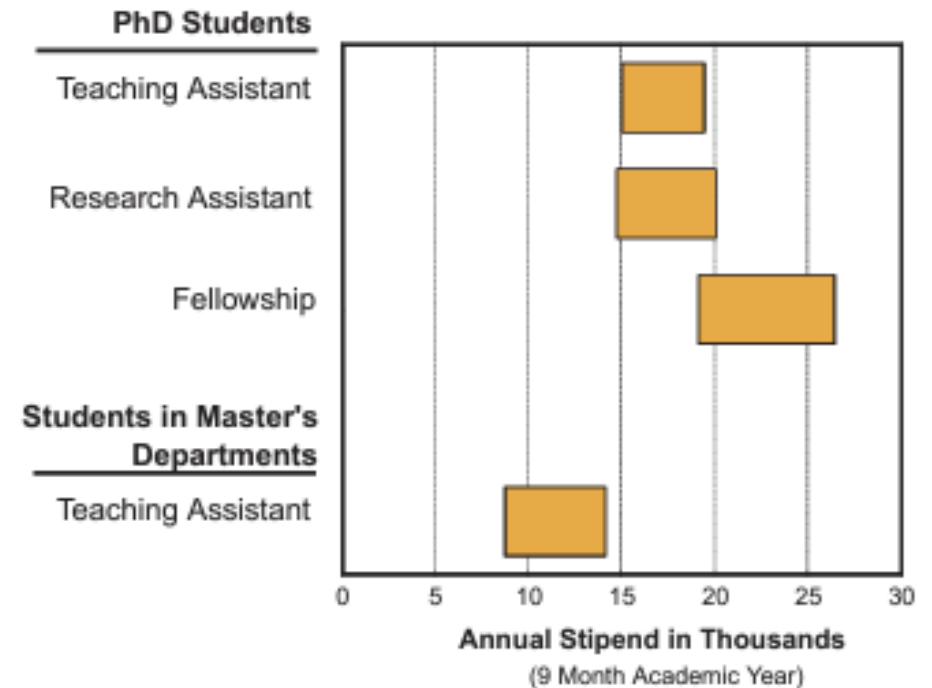
Types of financial support are for the 39% of new physics bachelors that enrolled in a US PhD program in the classes of 2019 and 2020 combined. Distribution of graduate study fields: Physics or Astronomy – 65%, Engineering – 17%, Other Fields – 18%. The green segments represent the proportion of graduate students that were self-funded, which includes: family assistance, loans, and wages. Many full-time students also receive tuition waivers.

Stipends

You get paid a living wage
Plus lots of benefits and perks

Typical Stipends

First-Year Physics Graduate Students



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

Source: AIP Statistical Research Center, First-year Graduate Student Survey, 2009-10.

2/3 say a grad degree is the new professional norm



They're motivated to earn their degree

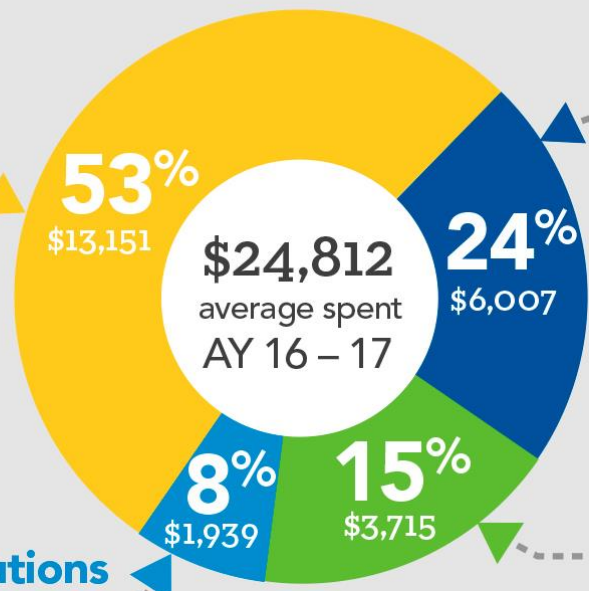


63% begin a grad program within 1 year of their undergrad degree

Where the money for grad school comes from

Student borrowing

- 64% of students file a FAFSA



Student earnings

Includes income and savings

- 3% is paid for by tuition reimbursement or other employer benefits

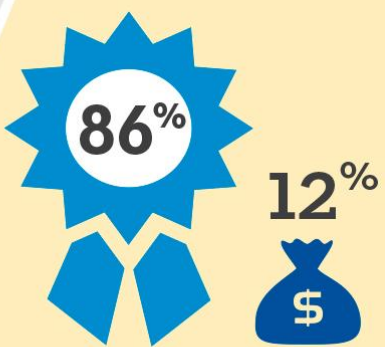
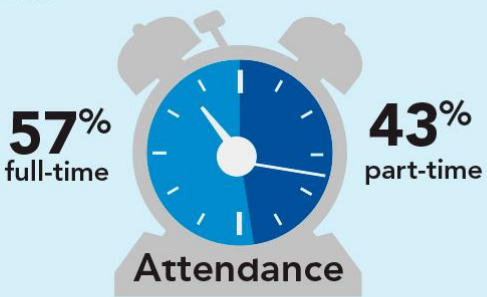
Grants, fellowships, scholarships, and tuition waivers

- 40% of students take advantage of free money

External contributions

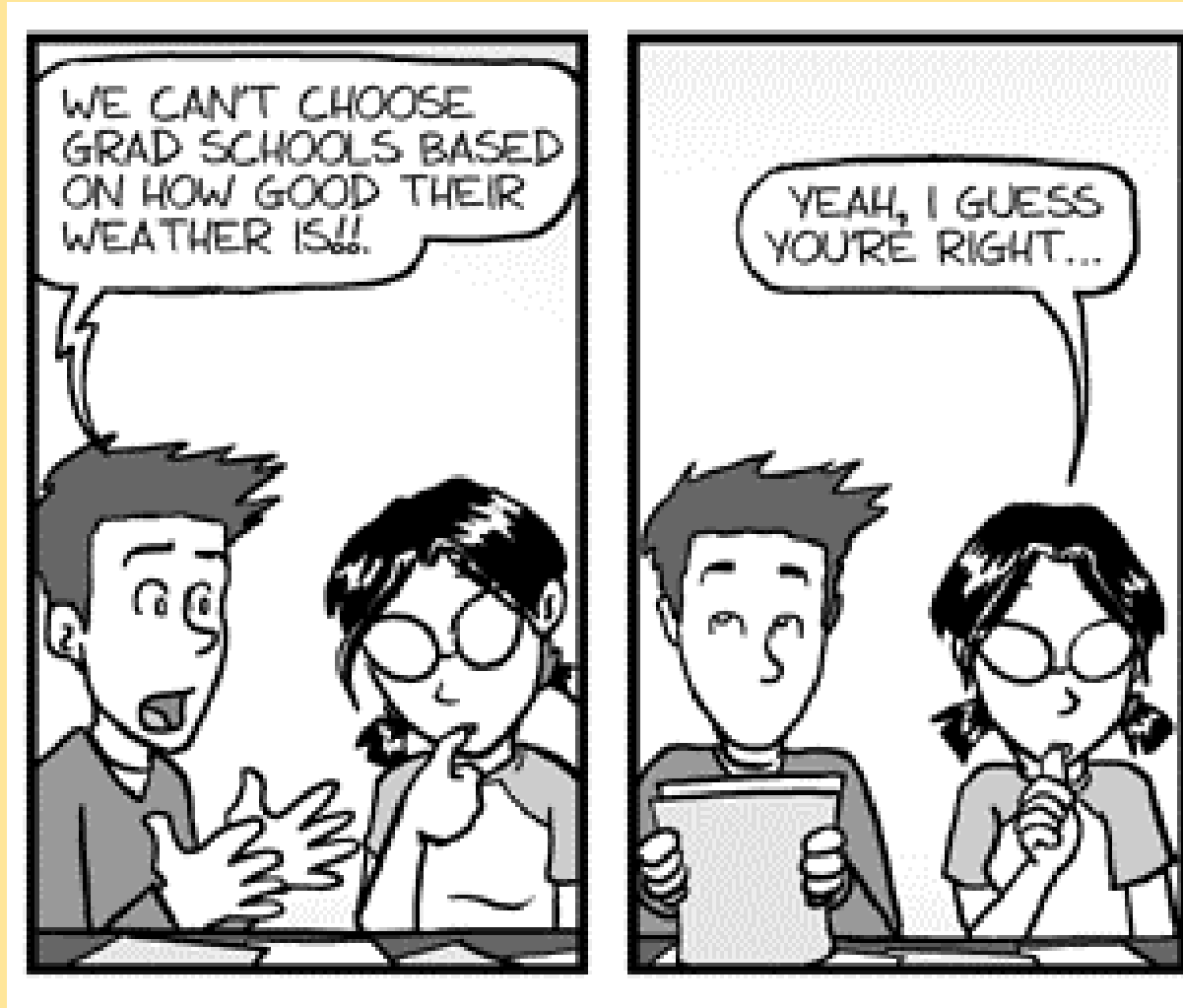
- 17% of students receive money from family and friends

More attend full-time than part-time



More students choose a school based on **quality or convenience** than **cost**

How do I apply to grad school?



Applying to graduate school



Applying to graduate school

<https://www.princetonreview.com/grad-school-advice/application-timeline>

- **May:** Begin [researching grad schools](#). Take a [GRE practice test](#). Your GRE score will help you determine how much preparation you'll need for the real deal.
- **June:** Sign up for a [GRE test prep course](#) (we recommend the in-person or online options). Register for the [GRE general test](#) if necessary.
- **July:** Request information from schools that interest you. Consider paying a visit to your alma mater to meet up with a few former professors. They can recommend good programs and may even help you make some connections.
- **August:** Take the GRE general test. If you're not happy with your scores, sign up to take it again. Begin drafting your [statement of purpose](#).
- **September:** Register for the November GRE subject test (if necessary). Finalize your list of [prospective schools](#), and familiarize yourself with the professors who share your research interests at each school. Contact your recommenders. Keep polishing your statement of purpose.
- **October:** Request official transcripts from your undergraduate institution. Send your recommenders supplemental materials (like your resume, personal statement, etc.) that they can use as a reference. Make contact with students and professors at your prospective schools. Arrange a campus visit if you can.
- **November:** Have someone in the field and a few smart (and honest) friends read over your personal statement. Take the GRE subject test; make sure that your scores will be sent directly to schools.
- **December:** Complete and submit all [grad applications](#), keeping copies of every section for your records. Verify that your recommendations have been sent.

What is important for admission?

- Grades (3.0 minimum)
- Research experience
- Letters of recommendation
- Statement of purpose
- GRE General Test (www.ets.org)
- verbal, quantitative, analytical writing sections
- Computer based make appointment
- (1st come, 1st served)

GRADUATING SOON?

GradSchoolShopper Simplifies Your Search
with an online directory of physical science programs
and advice for outgoing physics & astronomy undergrads.

The Guide to Grad School

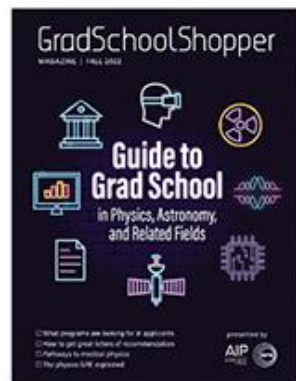
Read the *Guide to Grad School in Physics, Astronomy & Related Fields* for advice specific to physics & astronomy students on topics like:

- Who Pays for a PhD?
- Grad School Application Timeline
- Grad School Visit Guide
- How to Craft Standout Applications
- Make a Statement with Your Personal Statement
- How to Get Great Letters of Recommendation
- The Physics GRE Explained
- PLUS: Reflections from real grad students

The Online Directory

Search and compare grad programs at **GradSchoolShopper.com** The most comprehensive online directory of grad programs in the physical sciences, where you can:

- Browse by sub-field and location
- Sort programs by acceptance rate, application deadline
- Compare figures for enrollment and degrees granted per program
- Get direct access to faculty, research areas & more!



**Start your
search!**



GradSchoolShopper

presented by



Where to apply?

- Important considerations
 - M.S. or Ph.D?
 - Quality of program in your chosen area
 - Chronicle of Higher Education survey
 - Check out websites of departments
 - Geography and personal issues
 - What factors are important to me?
 - What makes a department / program good ?
 - Faculty
 - Facilities
 - Other students!
 - Am I good enough?
 - Go to the best school you can! Aim high, but be realistic and have safety schools
 - Get advice from faculty and advisors
- <http://www.phds.org/rankings/>
- <http://grad-schools.usnews.rankingsandreviews.com/best-graduate-schools>

Loyno Career Development Center

- <https://career.loyno.edu/students/schedule-appointment>



Career Coaching

Meet with a Career Coach to start preparing for your future career!

[SCHEDULE AN APPOINTMENT](#)



Handshake

Looking for a job or internship?
We have a curated online job board just for our students and alumni.

[VISIT HANDSHAKE](#)



Events & Programs

Learn more about our many career events and how you can participate

[LEARN MORE](#)



Recruiting at Loyola

Are you an employer interested in hiring our students?

**QUICK
LINKS**

[POSTING JOBS & INTERNSHIPS](#)



Jill Boatright

**Director, Career Development
Center**



Katie Bandy Krikorian

Assistant Director for Internships



Emir Bailey

Student Employment Coordinator



Grace Kalka

**Recruitment and Employer Events
Coordinator**



Abby Woods

Career Coach



Alejandra Bedoya

Graduate Assistant

Advice about Recommendation Letters

Applying for summer REUs can be a great practice round for when you want to apply for graduate schools.

- Rec letters are definitely one of the most important pieces of any application, since GPAs and resumes don't always tell the selection committee very much.
- Your goal should be to develop good relationships with at least 3 professors at Loyno who can write you strong letters of recommendation.
 - **When to ask:** Ideally you should be asking for a letter at least a month in advance. These letters take time and care to write.
 - **How to ask:** “Would you be willing to write me a strong letter of recommendation? The first deadline is February 20th.”
 - **What to include:** Offer to send your resume and essays so that they can brag about you with lots of personal information. If you are applying to a lot of things, it can be very helpful to set up a spreadsheet with deadlines and how to submit each letter
 - **How to get to know your professors:** Office hours! Office hours! Office hours! It is really challenging to write a letter for a student with whom you have never talked one-on-one.

Advice about resumes

- first of all, scientists sometimes call a resume a CV or "curriculum vitae". It's basically the same thing, but it can be longer.
- The Loyno [Career Development Center](#) has some advice about writing resumes.
- If you have technical skills, you definitely want to include descriptions of the equipment, programs, and programming languages you have used.
- If you have research experience, you will want to put together a bulleted list of the specific activities and accomplishments.

Advice about personal statements

Most programs ask for some form of written statement, which is your chance to verbally convince them that they want you in their program. Statements will be very different for different people, and your statement will change over time as you gain experience. Some advice/suggestions:

- **What makes you unique?** -- You want to be different from other applicants. You ARE different, so find a way to show that. Demonstrate your determination, give an example of why you're interested in this area, describe your experiences.
- **Be specific about experiences** -- Remember, everyone else applying may be a physics major interested in a research experience. They may even also want to save the world by [inventing a new battery], just like you! It doesn't mean you need to try really hard to find the perfect words, just be sure to give examples from your own life and experience that is leading you to the decision to apply to this program. Maybe you attended a seminar that excited you about this specific topic, or maybe you already have research experience in the area. Or maybe you tried experimental work and now want to try computational work because of a class you took.
- **Don't make assumptions** -- If you have research experience and you want to brag about it, remember that the people reading your application may be in a completely different field and might not know anything about what you were working on. Explaining the background of what you were doing in a way that is understandable can be extremely impressive.

What happens after grad school?

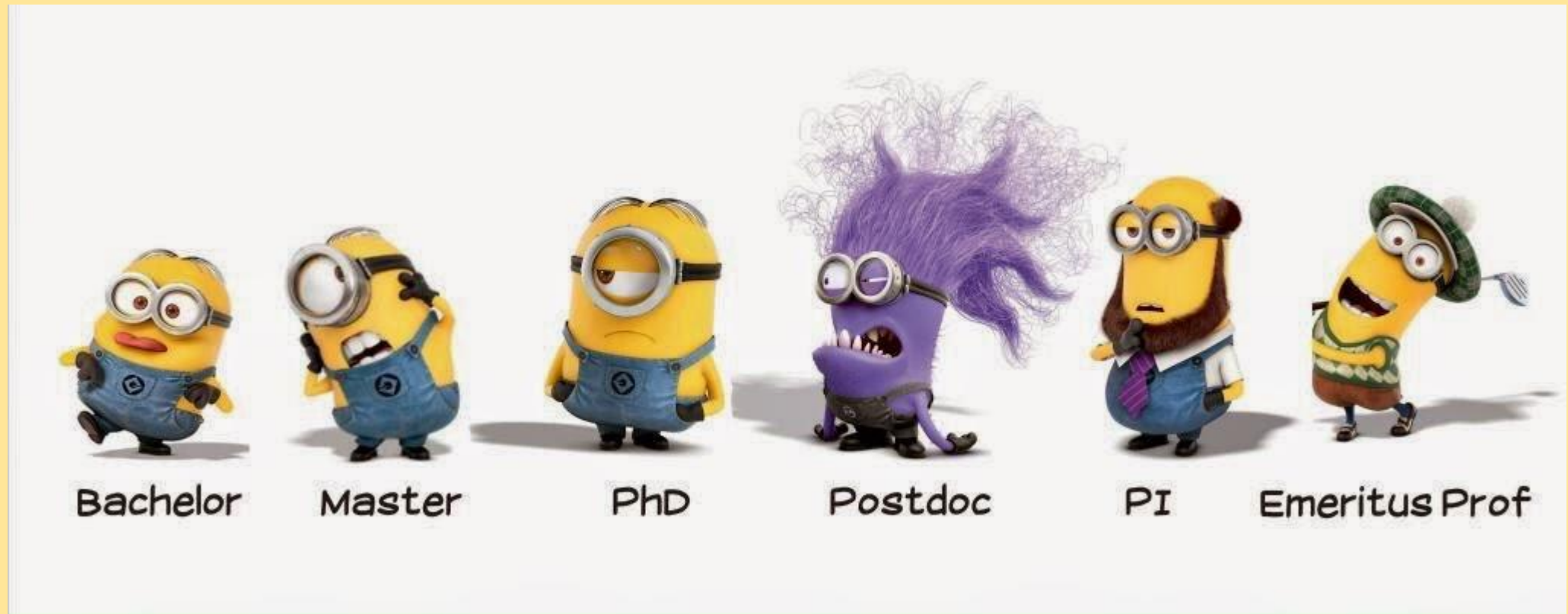



Table 4. Bachelor's degree to enter:
Occupations projected to have the most openings each year, on average, 2019–29



Occupation	Occupational openings, projected 2019–29 annual average	Median annual wage, 2019	Typical work experience in a related occupation
General and operations managers	204,400	\$100,780	5 years or more
Registered nurses	175,900	73,300	None
Software developers and software quality assurance analysts and testers	131,400	107,510	None
Project management specialists and business operations specialists, all other	128,000	73,570	None
Accountants and auditors	125,700	71,550	None
Elementary school teachers, except special education	103,200	59,670	None
Management analysts	87,100	85,260	Less than 5 years
Market research analysts and marketing specialists	84,200	63,790	None
Personal service managers, all other; entertainment and recreation managers, except gambling; and managers, all other	74,500	110,630	Less than 5 years
Secondary school teachers, except special and career/technical education	71,100	61,660	None

Note: None of the occupations in the table typically require on-the-job training for competency.
Source: U.S. Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections.

Table 5. Master's, doctoral, and professional degree to enter:
Occupations projected to have the most openings each year, on average, 2019–29



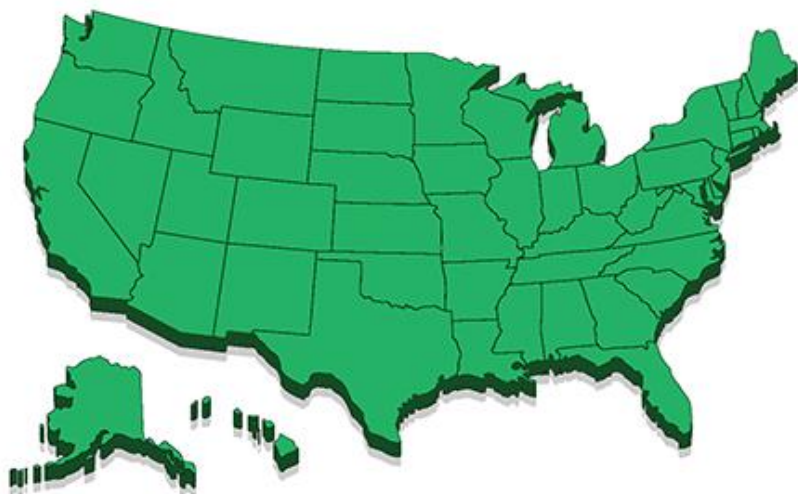
Occupation	Occupational openings, projected 2019–29 annual average	Median annual wage, 2019	Typical education needed for entry	Typical work experience in a related occupation	Typical on-the-job training
Lawyers	39,900	\$122,960	Doctoral or professional degree	None	None
Educational, guidance, and career counselors and advisors	33,100	57,040	Master's degree	None	None
Health specialties teachers, postsecondary	26,000	97,320	Doctoral or professional degree	Less than 5 years	None
Nurse practitioners	24,200	109,820	Master's degree	None	None
Education administrators, kindergarten through secondary	20,000	96,400	Master's degree	5 years or more	None
Healthcare social workers	19,600	56,750	Master's degree	None	Internship/ residency
Postsecondary teachers, all other	18,900	68,970	Doctoral or professional degree	None	None
Instructional coordinators	17,700	66,290	Master's degree	5 years or more	None
Physical therapists	15,200	89,440	Doctoral or professional degree	None	None
Speech-language pathologists	13,700	79,120	Master's degree	None	Internship/ residency

Source: U.S. Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections.

Who's Hiring Physics Bachelors

For a listing of the many employers that recently hired new physics bachelors by state, go to:

www.aip.org/statistics/whohires



WHO IS HIRING PHYSICS PhDs?

A listing of employers who recently hired new PhDs, including starting salaries, job titles and more.

aip.org/statistics/whos-hiring-physics-phds



JPMORGAN CHASE & CO.



Job Prospects For Physicists

Common Career Paths

Physicists find employment in a variety of settings after earning their degrees—including high schools, government funded labs, on wall street, in medical physics facilities, and high tech industries, just to name a few!

Explore our career track profiles to learn about typical educational background, salary, future outlook, and daily activities.

Search Physics Jobs

[Search Jobs](#)[Advanced Search](#) | [Job Alerts](#)[For Employers: Post a Job](#)

<https://aps.org/careers/physicists/prospects.cfm>



Business, technology, and education consultants work with various clients, combining data and analytics skills with relevant knowledge to find solutions within that sector.

Consultant



Data Science is a growing field in which many physicists find jobs. A data scientist works on designing and developing data models, often working with a team.

Data Science in Industry



Faculty positions at Bachelors/ Liberal Arts Institutions carry a strong emphasis on teaching and providing research experiences for students.

**Faculty at
Bachelors/Liberal Arts
Institutions**

Role	Salary	Demand
Forest and Conservation Technicians	\$40,000	-8%
Environment Science and Protection Technicians	\$41,437	11%
Wind Turbine Technicians	\$72,724	68%
Soil and Water Conservationists	\$45,440	7%
Wildlife Biologists	\$51,620	5%
Environmental Engineers	\$81,213	4%
Industrial Ecologists	\$76,530	8%
Climate Change Analysts	\$73,217	8%
Atmospheric Scientists	\$71,000	8%
Environmental Biotechnologists	\$73,728	8%
Environmental Physicists	\$73,000	8%
Environmental Statistician	\$98,027	33%

What can I do with a Bachelor's Degree in Environment?

Soil and Water Conservationists	\$45,440
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Wildlife Biologists	\$51,620
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Environmental Engineers	\$81,213
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What can I do with a Master's Degree in Environment?

Industrial Ecologists	\$76,530
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Climate Change Analysts	\$73,217
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Atmospheric Scientists	\$71,000
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What can I do with a Doctorate's Degree in Environment?

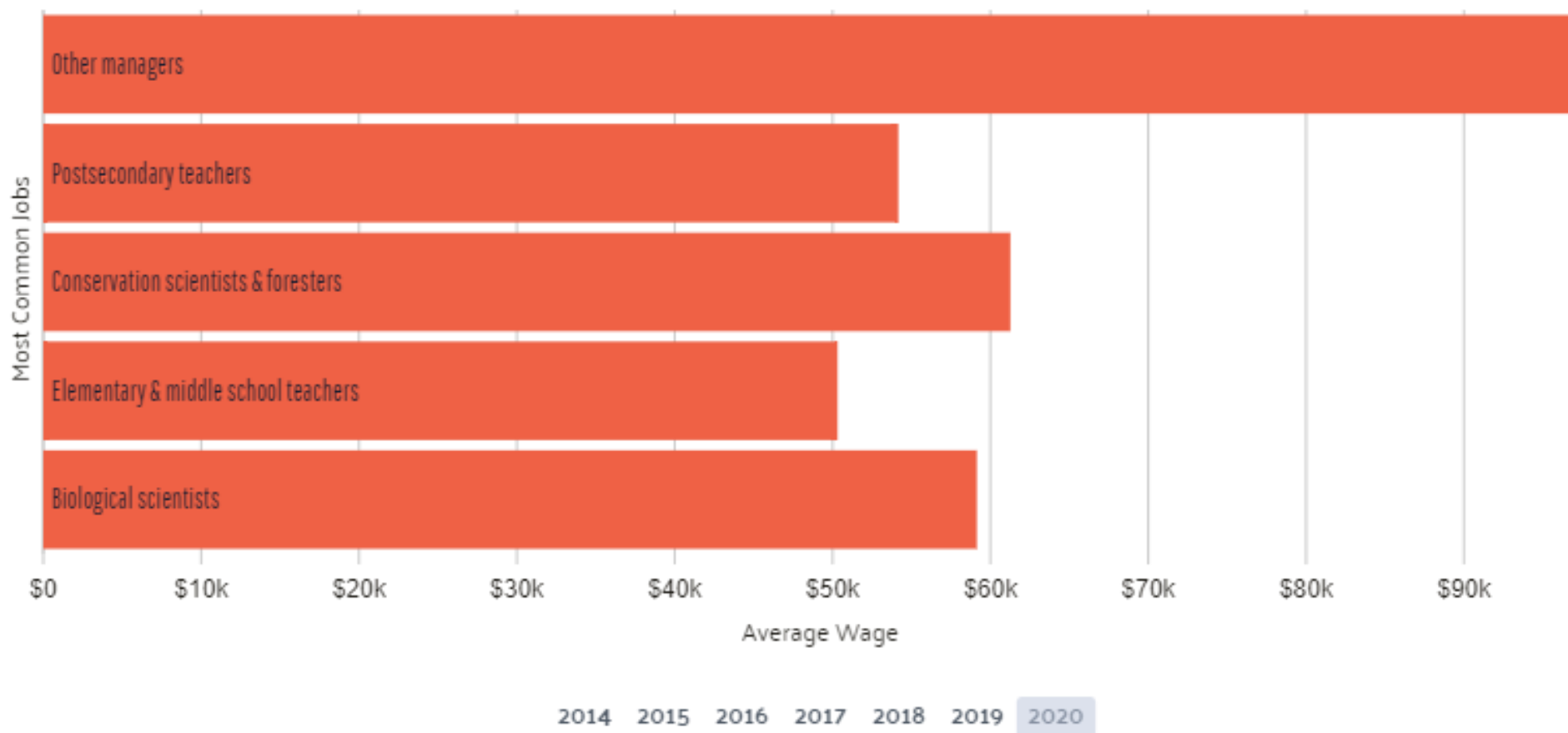
Environmental Biotechnologists	\$73,200
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Environmental Physicists	\$73,728
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Environmental Statisticians	\$98,027
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<https://research.com/careers/environmental-careers>

DATA USA: Environmental Studies



<https://datausa.io/profile/cip/environmental-studies>



Advice About Finding Summer Research

SUMMER

WHAT MOST PEOPLE THINK
ACADEMICS DO ALL SUMMER:



WHAT MOST ACADEMICS
ACTUALLY DO:



JORGE CHAM © 2018

WWW.PHDCOMICS.COM

Research as an Undergraduate

- Get involved with research at Loyno
- TONS of opportunities available for students to do research around the country
- WIN, WIN, WIN, WIN
 - Get involved with cutting edge research
 - Learn skills you can add to your resume
 - Build a network of connections
 - Get \$\$\$PAID\$\$\$

Who, me?

- Yes, you!
- You are an undergraduate, therefore you are qualified
- Even if you don't feel "ready" or qualified to apply, go ahead and apply anyways!
- It's great to just get experience with the application process, even if you don't get in, because then you will be more prepared when the next opportunity rolls around.

How to pick a research focus

- Don't stress about it! Try to be open minded!
- At this point in your career it doesn't really matter what you focus on, just that you get some experience doing something. You're absolutely not locking yourself into a topic for the rest of your life.
- You might even have a really lousy experience and then learn what type of things you want to avoid in the future, and that can be extremely valuable in its own way.

Loyno Research

- Read what faculty are doing on their faculty pages (Google “Loyno Physics faculty”)
- Send an email and ask!
- Worst thing that could happen is someone will tell you no but will be flattered that you were interested.

Loyno Career Development Center

- <https://career.loyno.edu/students/schedule-appointment>



Career Coaching

Meet with a Career Coach to start preparing for your future career!

[SCHEDULE AN APPOINTMENT](#)



Handshake

Looking for a job or internship?
We have a curated online job board just for our students and alumni.

[VISIT HANDSHAKE](#)



Events & Programs

Learn more about our many career events and how you can participate

[LEARN MORE](#)



Recruiting at Loyola

Are you an employer interested in hiring our students?

**QUICK
LINKS**

[POSTING JOBS & INTERNSHIPS](#)



Jill Boatright

**Director, Career Development
Center**



Katie Bandy Krikorian

Assistant Director for Internships



Emir Bailey

Student Employment Coordinator



Grace Kalka

**Recruitment and Employer Events
Coordinator**



Abby Woods

Career Coach



Alejandra Bedoya

Graduate Assistant

Other internships

- The American Institute of Physics maintains a [list of companies that employ undergraduate physics majors, by state](#). So you can look at a list of companies in Louisiana who hire physics undergrads.
- Loyno alums are useful contacts in industry and may know about summer internships at their companies. If you want to chat with me about finding an internship in a particular industry, I could possibly connect you with alumni who might be able to help.

Research Experience for Undergraduates (REU)

- NSF funded, in operation for 30 years
- Must be US citizen or permanent resident
- Science departments, national labs across the country
- 8-10 weeks, stipend of \$4-6k, with room, board, travel compensation
- Placed in a lab (supervised by a professor, directly mentored by a postdoc or graduate student)
- Extra programming focused on grad school prep and career development
- Communication of results

How to find REUs

- Official database of REUs: https://www.nsf.gov/crssprgm/reu/reu_search.jsp
- List organized by deadline date: <https://physics.mnstate.edu/cabanela/research/reulist.php>
- This website ([Pathways to Science](#)) has all sorts of great links, advice for applying for grad school, etc, including a great search engine for summer research.
- Don't be shy about exploring other science fields besides physics... pretty much any science/engineering field has some physics overlap.
- Ask your advisors and professors for help. I am constantly getting emails advertising for all sorts of REUs that I can forward.

Advice about Recommendation Letters

Applying for summer REUs can be a great practice round for when you want to apply for graduate schools.

- Rec letters are definitely one of the most important pieces of any application, since GPAs and resumes don't always tell the selection committee very much.
- Your goal should be to develop good relationships with at least 3 professors at Loyno who can write you strong letters of recommendation.
 - **When to ask:** Ideally you should be asking for a letter at least a month in advance. These letters take time and care to write.
 - **How to ask:** “Would you be willing to write me a strong letter of recommendation? The first deadline is February 20th.”
 - **What to include:** Offer to send your resume and essays so that they can brag about you with lots of personal information. If you are applying to a lot of things, it can be very helpful to set up a spreadsheet with deadlines and how to submit each letter
 - **How to get to know your professors:** Office hours! Office hours! Office hours! It is really challenging to write a letter for a student with whom you have never talked one-on-one.

Advice about resumes

- first of all, scientists sometimes call a resume a CV or "curriculum vitae". It's basically the same thing, but it can be longer.
- The Loyno [Career Development Center](#) has some advice about writing resumes.
- If you have technical skills, you definitely want to include descriptions of the equipment, programs, and programming languages you have used.
- If you have research experience, you will want to put together a bulleted list of the specific activities and accomplishments.

Advice about personal statements

Most programs ask for some form of written statement, which is your chance to verbally convince them that they want you in their program. Statements will be very different for different people, and your statement will change over time as you gain experience. Some advice/suggestions:

- **What makes you unique?** -- You want to be different from other applicants. You ARE different, so find a way to show that. Demonstrate your determination, give an example of why you're interested in this area, describe your experiences.
- **Be specific about experiences** -- Remember, everyone else applying may be a physics major interested in a research experience. They may even also want to save the world by [inventing a new battery], just like you! It doesn't mean you need to try really hard to find the perfect words, just be sure to give examples from your own life and experience that is leading you to the decision to apply to this program. Maybe you attended a seminar that excited you about this specific topic, or maybe you already have research experience in the area. Or maybe you tried experimental work and now want to try computational work because of a class you took.
- **Don't make assumptions** -- If you have research experience and you want to brag about it, remember that the people reading your application may be in a completely different field and might not know anything about what you were working on. Explaining the background of what you were doing in a way that is understandable can be extremely impressive.