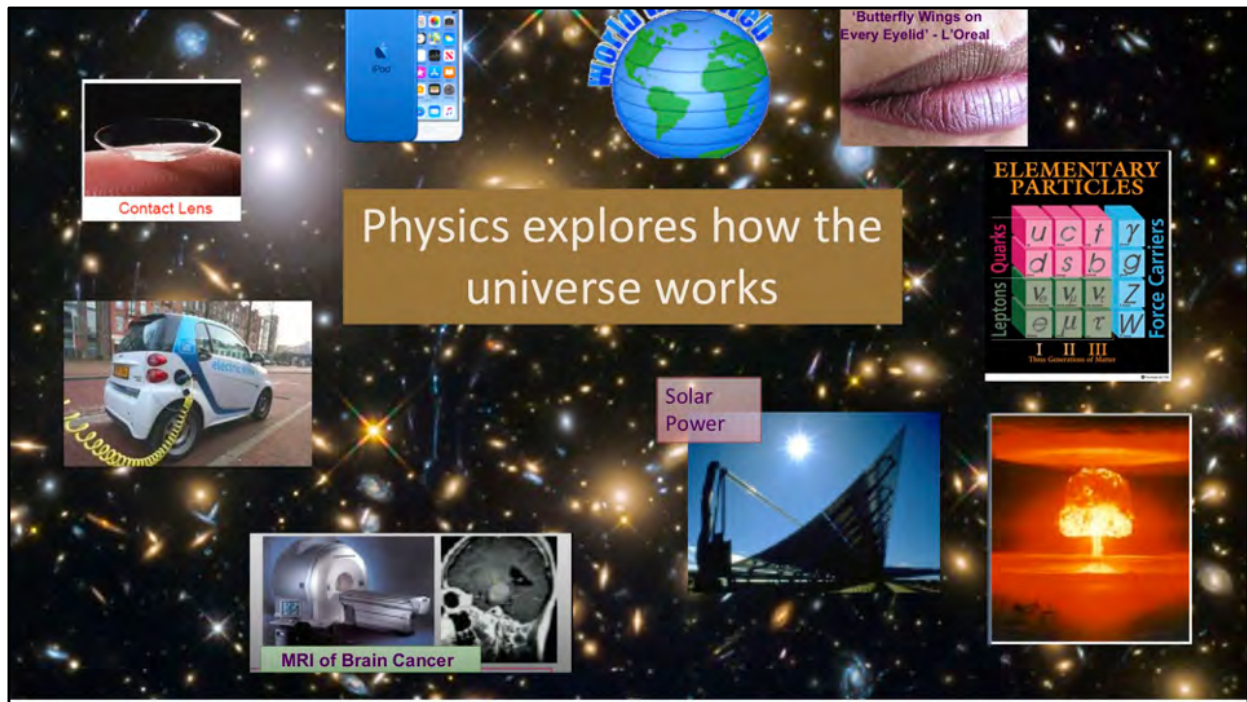


- Every one of you has the capability to graduate with a bachelor of science in physics.
- Every one of you is welcome, regardless of other identities you hold in addition to that of physics student.
- Every one of you may access campus resources to smooth your path through UW and help you transition to life beyond UW.



If you really want to major in physics, and you put in the work to build your skill and knowledge base, you will be able to get a physics degree. We recognize that some of you may not have had the same opportunities in high school, and for that reason we offer three different levels of a first course in physics. We find everyone catches up by the second year. There are many resources on campus to help you fill in any holes in your background - it is your responsibility to take advantage of these. We are large, and it is possible to slip through the cracks. If you ask for help, however, we can and will help you.



Physics is the exploration of how matter behaves and interacts - from the smallest subatomic particles to the formation of galaxy clusters. It also underlies many of the technologies that enable modern society. Physicists invented the web to stay connected and share data in international collaborations; your iPod depends on quantum mechanics and transparent conductors; the transformation of energy among its different forms and the manipulation of light and other forms of radiation are all core to physics. Physics is a living, breathing field making new discoveries every day. Undergraduates in our department last year worked on research ranging from applying machine learning to discovering new particles at the atom smasher in Geneva to modelling galaxy formation; from making superconductors that are two atomic layers thick to designing xray spectrometers; from measuring the kinetics of biological enzymes to developing prosthetics at the VA.

Learning Physics at UW

- Largest undergraduate program in the country (expect 200 graduates this year)
Lectures are large, but have breakout sessions in 100- and 300-level courses and in all lab courses
- Most UG do some sort of research
140 students last year in physics department
80% of majors do research/project on campus
- Society of Physics Students provides community

SPS Annual Trip to LIGO



Intro Tutorial



UG Collaborate on Research



Advanced Lab

UW has the largest UG program in the country. In the most recent national data, only 4 schools graduated over 100 majors - this year we will graduate 200. Ten years ago, we only graduated 57. This growth has been accompanied by a 10% decrease in the number of state-funded faculty, but we are continuing to provide an excellent education. You will need to make the effort, though, to be one of the students whose name we learn and who gets involved in our research. We provide 25-person breakout sessions at 100- and 300-level, and in all laboratories. We have a capstone requirement, and 80% meet that through research or participation in projects or engineering teams. SPS meets with colloquium speakers every week and has activities to provide community.

Getting Started – Pick the right 100-level route for you

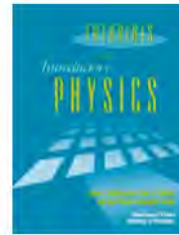
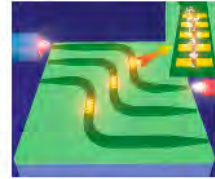
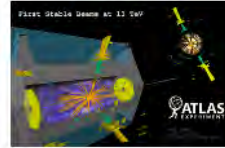
PHYS 10x	Conceptual Physics	Algebra only.	Only starts in AUT
PHYS 11x	Physics for Life Sciences	Pre-calculus, algebra based	Starts every quarter
PHYS 12x	Physics for Physical Sci & Engr.	Calculus co-requisite	Starts every quarter
PHYS 14x	Honors Physics	Calculus I pre-requisite	Only starts in AUT

HS Physics	HS Pre-Calculus	AP Physics	AB Calculus	BC Calculus		AUTUMN	WINTER	SPRING
NO	NO	NO	NO	NO	No HS prep	PHYS 101 MATH 120	MATH 124	PHYS 121 MATH 125
NO	YES	NO	NO	NO	Calc Ready	MATH 124	PHYS 121 MATH 125	PHYS 122 MATH 126
YES	YES	EITHER	EITHER	NO	HS Phys	PHYS 121 MATH 124	PHYS 122 MATH 125	PHYS 123 MATH 126
NO	YES	NO	YES	EITHER	HS Calc	PHYS 121 MATH 125	PHYS 122 MATH 126	PHYS 123 MATH 3XX
YES	YES	EITHER	YES	EITHER				
NO	YES	NO	YES	EITHER				
YES	YES	NO	YES	EITHER	Honors	PHYS 141 MATH 134	PHYS 142 MATH 135	PHYS 143 MATH 136
YES	YES	YES	YES	EITHER		or 125	or 126	or 126

We recognize that you have varied opportunities at your HS. If you never took physics, and have only finished through algebra 2, you should sign up for the freshman interest group that combines precalculus and conceptual physics by inquiry. The regular sequence for scientists and engineers officially has the first quarter of calculus as a co-requisite. We only recommend this if you have already seen either physics or calculus in HS. Learning both at the same time can be challenging, and you will be better off taking Math 124 first, and then starting the physics series. Most students take PHYS 121 with MATH 125 (integral calculus). If you have taken both calculus and physics in high school, and are willing to put in the effort, we recommend the honors version (PHYS 141-12-3). AP at most gives credit for 121 (mechanics) and 122 (E&M). Unless you had a very strong program, we recommend taking Honors 141-2-3 to refresh this material.

UW Physics Degree Options

- **Comprehensive**
 - Graduate school in physics or astronomy
 - Full range of physics and math
- **Applied**
 - Technical job at B.S. level or M.S. in engineering
 - More flexibility in electives
- **Teaching**
 - Communicate science to HS or general audience
 - Physics by Inquiry sequence
- **Biological**
 - Medical school, grad school in biophysics, biomed industry
 - 7 quarters of biology and chemistry in addition to physics core



<https://phys.washington.edu/declaring-major>

Our degree is flexible, with four different degree tracks depending on your interest and goals. All majors complete a common core: introductory mechanics (energy and motion), electricity and magnetism, waves, optics, thermal and statistical physics, quantum mechanics. Also mathematical tools, electronics lab, advanced electricity and magnetism. Remainder depends on degree option. Choose your option by choosing the courses you wish to take, then figuring out which makes you add the fewest number of courses not on that list. The different degree requirements are listed on a slide near the end of this file.

Why major in physics?

- **GOOD reasons**

- Because you REALLY want to know WHY the world works
- Because the list of courses you REALLY want to take at UW gets you a physics degree (or at least close to one)
- Because you explored several other options, and you like physics the best

- **Reasons that tend not to work out well ...**

- Because you decided to do so in middle school
- Because engineering turned you down
- Because mom and dad said to

UW offers over 200 undergraduate degree options, and that is before you start to mix and match

Physics is a great “liberal arts” major in STEM. It prepares you for a wide variety of careers and educational opportunities. It does require focus, resilience and hard work. Students who do not really want to be here, tend to struggle. They usually thrive once they find their place elsewhere in the university. We require students complete the introductory sequence and start the 200-level courses before being admitted to the major so they know what they are getting into and are assured of having the prerequisite knowledge in hand for success.

Physics is Capacity-Constrained

WHY?

- For the past 5 years, we have had the largest undergraduate program in the country
 - 200 undergraduates have already applied to graduate this year, a record
- Ten years ago
 - we graduated 57 physics bachelors in a single degree track.
 - we had 4.5 more tenure-track faculty FTE than we do now
 - we could fit our required 300-level courses in an 80-seat lecture hall
- Choice: limit the number of majors or decrease the requirements to graduate
 - Bottlenecks: Advanced Laboratory and Capstone Opportunities

GOING FORWARD

- We hope to admit to the major all students who truly want to be physics majors and who have the skill and knowledge base to succeed in the major.
- Prior to Winter 2020, the requirements were to earn ≥ 2.6 in recent physics and math classes. The median grade in the introductory sequence is typically 2.8.
- How competitive admission will be depends on the level of interest. We admitted 80% in winter.

We were forced to become capacity-constrained to continue to provide an excellent and broad education under our current level of resources. Admissions cycle: open every Autumn and Spring. Apply during first three weeks of quarter while taking a 200-level or higher course. Winter is reserved for transfers and extended premajors only. Last quarter was our first cycle. We admitted 80% of applicants.

What does it take to be a physics major?

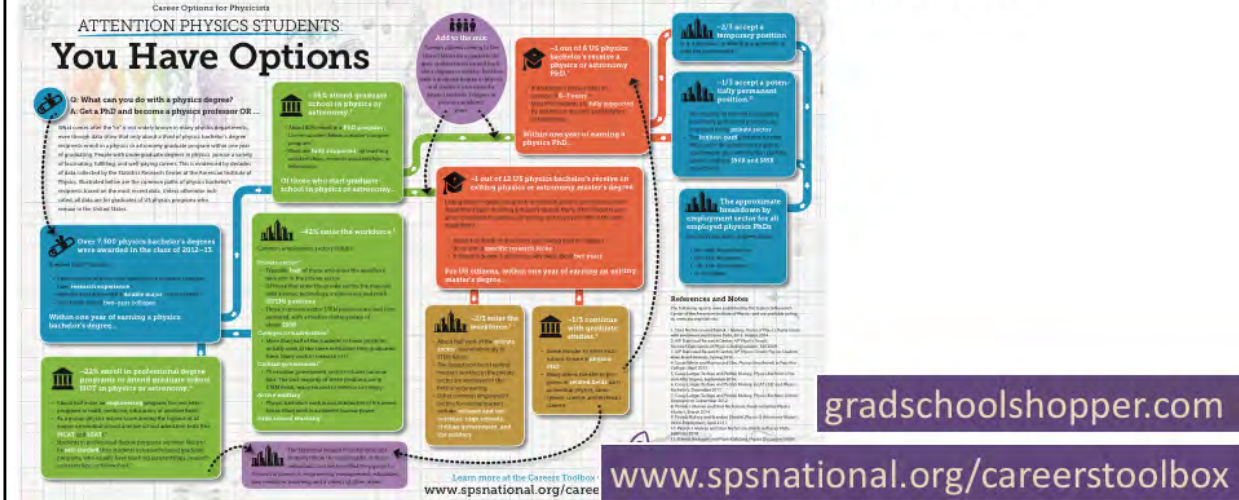
- Interest –
 - Keen to learn about how and why matter interacts
 - Enjoy “mathematization” of events and processes, and using the results to predict the future
 - Proactive participation in your own learning
 - Desire to pursue a career that uses physics knowledge and skills
- Skills –
 - Time management and organization
 - Problem solving
 - Mathematical facility
- Knowledge base –
 - Algebra, Trigonometry, Calculus
 - Introductory physics series (mechanics, electricity, magnetism, waves, optics, quanta, heat)

Typically apply Autumn or Spring of 2nd Year

If there are holes in your skill or knowledge base, you can fix them with enough interest to seek out the resources that will help you fill those holes. If you have been admitted to UW, you are smart enough to be a physics major. Students who struggle in the major typically have had something external impact their studies – health issues, change in family circumstances, new interests developing outside of physics. Often, engagement in research makes the coursework “real” and improves students’ grades.

What comes next?

- You can take any job where they want you to solve complex problems.
- You can attend any graduate program that builds on a physics base.



If you want information about national statistics on what physics majors do after graduation, and how to find a job, the national society of physics students is a great resource: spsnational.org. Their careers toolbox has a lot of useful information. Another good source is the American Institute of Physics, which has a great dataset on physics education and careers at aip.org/statistics. For graduate school information, go to gradschoolshopper.com. Our students get great jobs and are admitted to top graduate schools in physics, astronomy, data science, engineering.

Immediate Plans After Physics B.S. ...

- National Data: 1 year post graduation
from aip.org/statistics

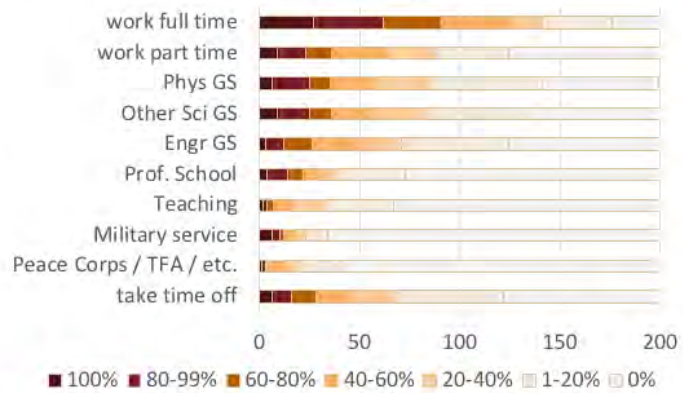
Physics Bachelors 1 Year Later

8,800 Recent Degree Recipients



- UW Data: Pre-graduation 2020 (200 students)

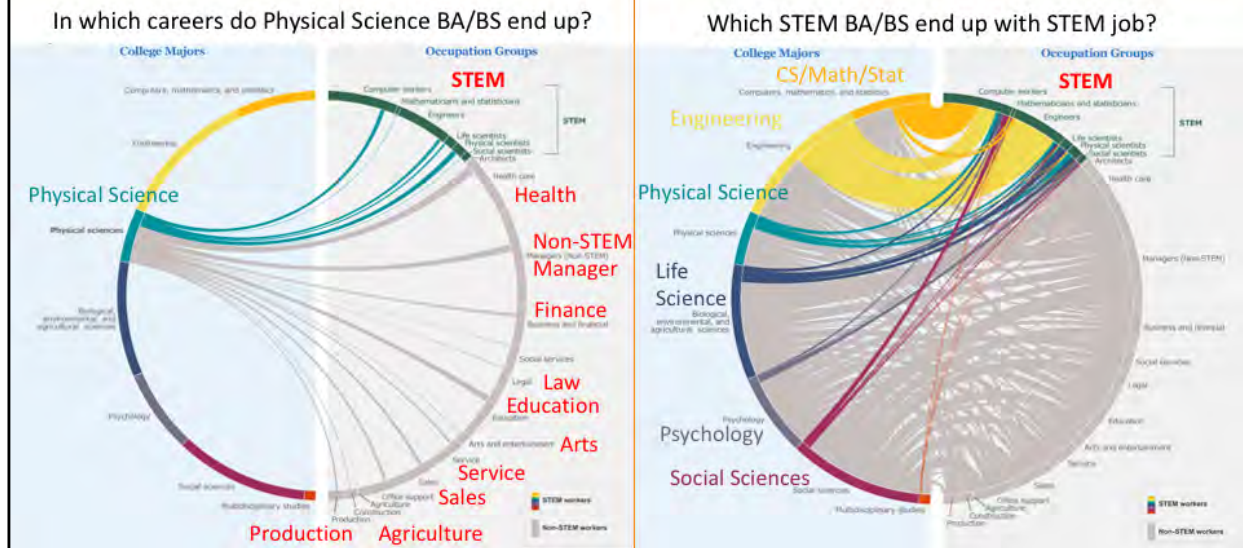
Estimated Probability I will ...



Nationally, a little over half of physics graduates are working one year after their degree. Of those who go to grad school, 60% go in physics or astronomy, and the rest in engineering, CS, education, etc. Locally, a slightly higher fraction go directly to the work force or to engineering master's programs, a consequence of our applied physics degree option.

Occupation vs. College Degree – you have OPTIONS

<https://www.census.gov/dataviz/visualizations/stem/stem-html/>



In 2010, the Census bureau asked people what their bachelors degree is in, plus what their job category is. Physical scientists end up all over. Only about 20% end up in a “STEM” job. Note, however, that many of the others use their science background. For example, I count under “Education”; in the Arts, someone might be programing realistic CGI footage; Law could be patents. Note that engineering and CS are far more likely to stay in their field, but even then, only about half do.

Typical Job Titles/Salaries 1 yr Post B.S.

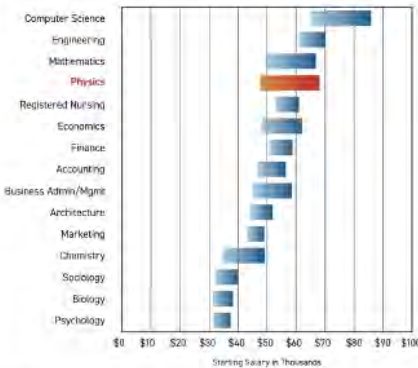
Engineering		Research & Technical	
Systems Engineer	Application Engineer	Research Assistant	
Electrical Engineer	Development Engineer	Research Associate	
Design Engineer	Engineering Technician	Research Technician	
Mechanical Engineer	Field Engineer	Lab Technician	
Project Engineer	Process Engineer	Lab Assistant	
Optical Engineer	Process Technician	Accelerator Operator	
Manufacturing Engineer	Product Engineer	Physical Sciences Technician	
Manufacturing Technician	Product Manager		
Laser Engineer	Research Engineer		
Associate Engineer	Test Engineer		
Technical Services Engineer	General Engineer		

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
Substitute Science Teacher

Data from American Institute of Physics (aip.org/statistics)

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



Bar chart represents the median 2018 starting salary, with the 25th and 75th percentiles.
Reprinted from the Summer 2018 Salary Survey, with permission of the National Association of Colleges and Employers, copyright holder.

@AIPStatistics

aip.org/statistics

With a little planning, physics majors can be competitive for most of the jobs that engineers apply to. Physics salaries one year out are good. UW Applied Physics students interested in these jobs should attend engineering job fairs and get involved in engineering teams such as robotics, human powered submarine, advanced rocket propulsion, etc.

Who hires physics bachelor's in Washington State?

Washington Employers that recently hired new physics bachelor recipients (2014-2018 data)
<https://www.aip.org/statistics/washington>

AbbVie	Factset	Orbital ATK	
AeroTEC	Fidelity Investments	Ozone International	
Allen Institute for Brain Science	Fred Hutch Cancer Res Ctr	Pacific Northwest National Laboratory	
ALS Global	G.S. Builders	Pellego	
Amazon	Google	Physio-Control Inc	TigerStop
Applied Motion Systems	HopeSource	Professional Credit Service	United States Navy
Areva	HP Inc.	PSC Biotech	UT Austin
Assemble Inc.	Inst. Defense Analyses	Puget Sound Energy	UW
Battelle	Inst. Environmental Health	Radiant Vision Systems	UtiliQuest
Bluetooth SIG, Inc.	Inst. Health Metrics & Eval.	RAFI USA	Visiongate
Boeing	Intellectual Ventures	Raisbeck Engineering	VL Systems
BTownWeb	Jacobs	Randstad	WA State Dept of Transportation
Carlisle IT - Tri Star	Lease Crutcher Lewis	Scribe America	Woodruff Sci. Computing
Casey Products	Leidos	Seattle Children's Research Institute	
Chipton Ross	Manufacturing Technology Inc.	Silicon Mechanics	
Corvus and Columba LLC	Marchex, Inc.	Tableau Software	
Dynetics, Inc.	Microsoft	Tecplot Inc.	
Eagle Harbor Technologies, Inc.	Microvision		
Electroimpact, Inc.	Mott MacDonald		

These are mostly UW grads – ranging from those you expect, like Amazon, Google, Boeing to venture capital, public utilities, tech suppliers. Anything where you need to solve complex problems.

We look forward to your joining us!!

Graduation 2019



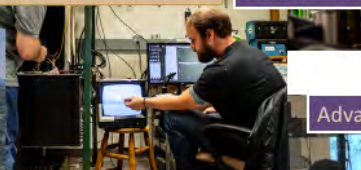
Intro Tutorial



To talk with us or get your questions answered during the COVID-19 shut-down:
<https://phys.washington.edu/advising-student-services-0> physadvs@uw.edu

UG Collaborate on Research

SPS Annual Trip to LIGO



Advanced Lab



Details for the Interested Student

- Contact Information for Physics Student Services and Advising
- Major Requirements: Core + Degree Options
- Minor Requirements
- Major Application Procedure
- Satisfactory Progress Policy
- Selected Data from 2020 Pre-Graduation Survey
 - Career goals
 - Research participation
 - Factors that can delay graduation
 - Satisfaction with program
 - Preparation for program

15

Physics Student Services – PAT C139

- Director of Student Services
 - Catherine Provost (cuala@uw.edu)
 - All graduate issues
 - Grad school-related UG issues
- Staff Advisors
 - Margot Nims (sassy2@uw.edu) and Paula Newcomer (newcomer@uw.edu)
 - All undergraduate issues
- Introductory Sequence Program Coordinator
 - Susan Miller (susanh82@uw.edu)
 - 100-level course logistics
- Faculty Advisor
 - Prof. Marjorie Olmstead (ufaphys@uw.edu)
 - advice from a faculty member
 - waivers and substitutions
- Program Assistant
 - Amy Glenz (amyglenz@uw.edu)

If you aren't sure who should answer your email:
physadv@uw.edu

To reach us during the COVID-19 shut-down:
<https://phys.washington.edu/advising-student-services-0>

16

Common Physics Core (55 cr) – taken by all majors

- 5-quarter overview of physics (21 cr)
 - Motion; Electricity & Magnetism; Oscillations & Waves; Thermal Physics; Quantum Physics
- Key tools for doing physics (8 cr)
 - Mathematical tools
 - Electronics lab
 - Overview of physics research
- Common sequence for applying those tools (8 cr)
 - Advanced Electricity and Magnetism
- At least 4 quarters of math (≥ 18 cr)
 - One year of Calculus
 - Selections from Linear Algebra, Differential Equations, Vector Calculus, Partial Diff. Eqn, Complex Analysis

See <https://phys.washington.edu/major-requirements>

17

Physics Degree Option Requirements

	Comprehensive (+38-41 cr)	Applied (+33-36 cr)	Teaching (+38-41 cr)	Biological (+51-55 cr)
Math	Math Phys II + Another adv. math	Matlab or Python + +2 adv. math	Math Phys II + Another adv. math	Math Phys II
32x	Relativity & Particles, Quantum Mechanics; 3 of E&M, QM, Astro, Classical Mech, Stat Mech	One from "call me a physicist" list	Relativity & Particles, Quantum Mechanics; 1 more "call me a physicist"	Quantum Mechanics Statistical Physics 1 more "call me a physicist"
Lab	Two advanced labs	Data Analysis lab Two advanced labs	One advanced lab	(in bio/chem)
Capstone	Research or Seminar	Research, internship or Seminar	Teaching practicum	bio-related research
UD Elect	2 additional Phys/Cognate Class	3 additional Phys/Cognate (may include 1 lab; 1 intro sci)	Sequence for future teachers	Biophysics
Other Sci				1 year intro chemistry 2 qtrs. Intro biology 2 additional bio/chem

18

Physics Minor (30-36 cr, plus math*)

Core (21 cr)	https://phys.washington.edu/minor-physics
Motion, Electricity & Magnetism, Oscillations & Waves, Thermal Physics, Quantum Physics	
Specialization (Pick 1)	
Physics Education (15 cr)	Physics by Inquiry Series
Experimental Physics (9 cr)	Intro Laboratory Analysis Electronics Lab Additional Advanced Lab
Mathematical Physics (12 cr)	Math Physics I and II: Phys 227, 228 Either Electricity & Magnetism (321) or Quantum Mechanics (324)

*Note: Prerequisites for these classes includes 15 credits of calculus sequence, plus 6-7 credits of advanced math

19

Declaring a Physics Major

1. Complete PHYS 123 and MATH 126. [See https://phys.washington.edu/declaring-major](https://phys.washington.edu/declaring-major)
2. Take a physics course within the previous two quarters and be enrolled in a physics course with number > 220.
3. Develop a graduation plan and enter into UW MyPlan.
4. Personal statement addressing reasons for choosing physics and strategies for success in the major.
 - Apply online during first three weeks of Spring or Autumn quarter.*
 - Meeting minimum requirements does not guarantee admission. Admission is capacity constrained, based on holistic review of a student's record.
 - New majors must agree to the department [Code of Conduct](#) and have their graduation plan approved by Physics Student Services.
 - See department [website](#) for sample graduation plans

* Winter quarter for transfer students or extended premajors only

20

Criteria for Satisfactory Progress

- Students must take physics courses, courses from the menu of math classes, or electives in other departments that meet a requirement for the physics major. Exceptions (e.g. for double major, study abroad) should be pre-approved.
- Maintain a cumulative average GPA of at least 2.0 in all physics classes.
- Students must earn a numerical grade of at least a 2.0 in each course used to satisfy the requirements of the physics major.

See <https://phys.washington.edu/uw-physics-major-continuation-policy>

21

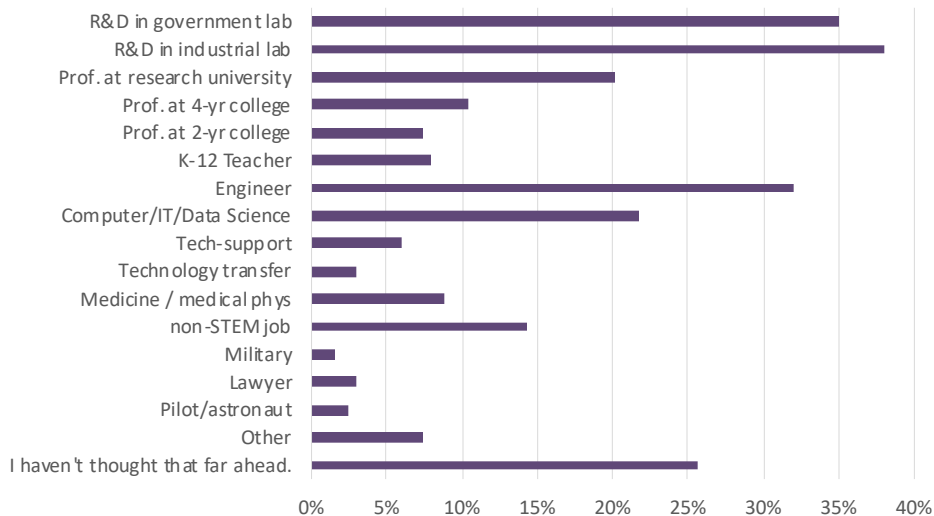
Some results from this year's survey of graduating seniors (filed 2 to 10 months prior to graduation)

- Career Goals
- Participation in Research
- Causes for delays in their graduation
- How well their previous institution prepared them for the physics major

22

Career Goals

What type of job do you envision having in 10-15 years?
(check all that apply)



23

Participation in Research

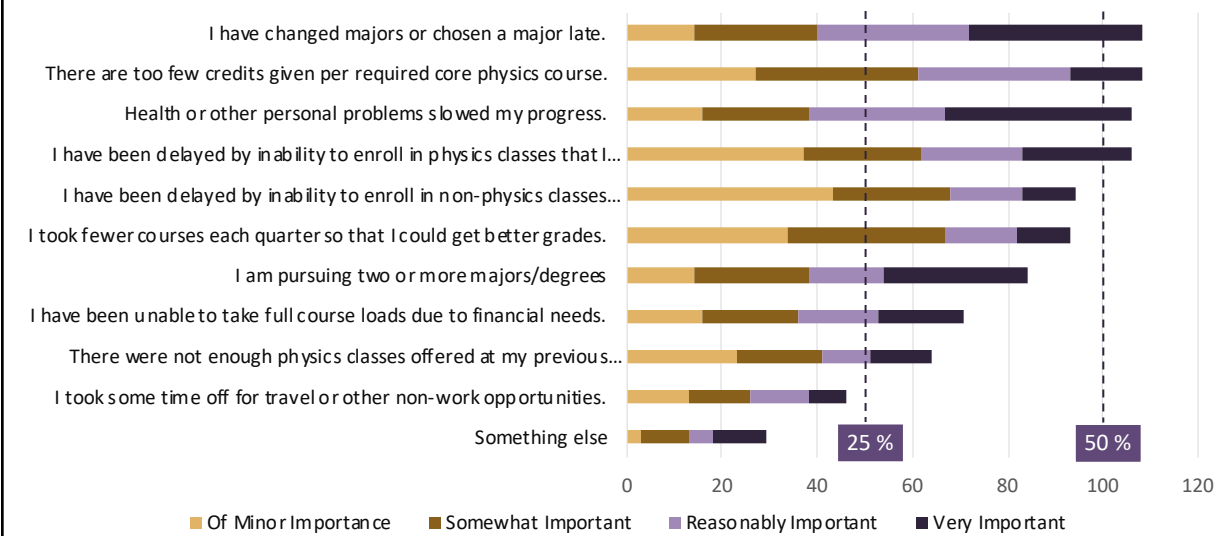
- From 2019-20 Graduation Survey (filed 2 to 10 months before graduation)

Have completed research for credit	59%
Plan to do so before graduation	21%
No, I had difficulty finding project or fitting to my schedule	16%
Not interested in pursuing research	4%

- From Transcripts Aut 16 through Win 20
 - 302 distinct students received undergraduate credit for doing research with 43 distinct physics faculty, for a total of over 1200 credit hours
 - 80% of graduates received credit for doing research either in physics or elsewhere on campus

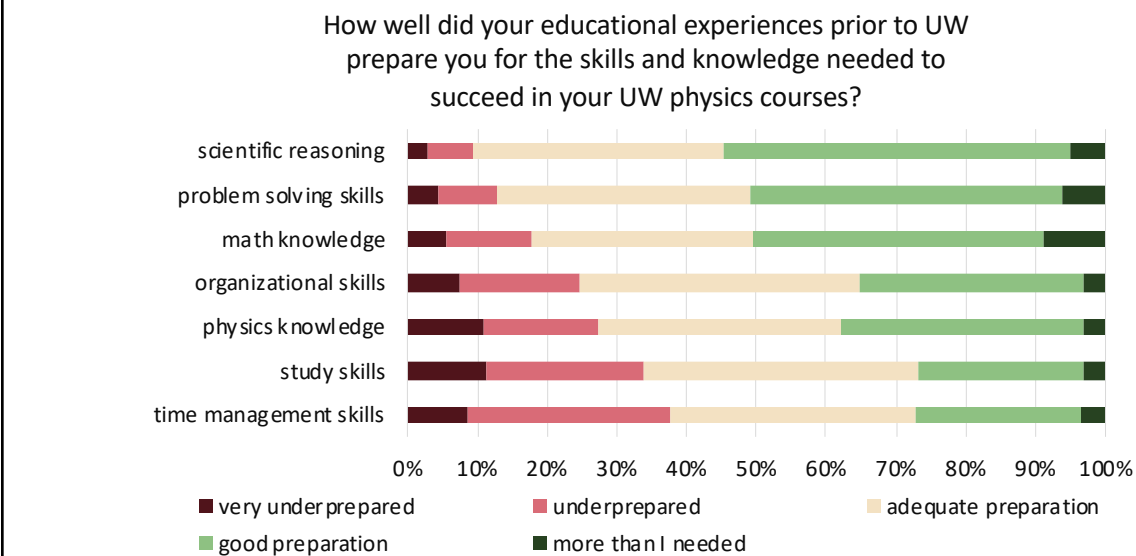
24

What factors impacted your ability to graduate in four years from starting college (at UW or elsewhere)?



25

Preparation for our program



26