• 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.
Physics explores how the universe works
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
## Getting Started – Pick the right 100-level route for you

<table>
<thead>
<tr>
<th>HS Physics</th>
<th>HS Pre-Calculus</th>
<th>AP Physics</th>
<th>AB Calculus</th>
<th>BC Calculus</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>YES</td>
<td>YES</td>
<td>EITHER</td>
<td>EITHER</td>
<td>NO</td>
</tr>
<tr>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>EITHER</td>
</tr>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>EITHER</td>
</tr>
<tr>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>EITHER</td>
</tr>
</tbody>
</table>

### Autumn
- PHYS 101
- MATH 120
- Only starts in AUT

### Winter
- MATH 124
- PHYS 121
- PHYS 122

### Spring
- PHYS 123
- MATH 126
- PHYS 141
- MATH 134 or MATH 125
- PHYS 143
- MATH 136 or MATH 126

<table>
<thead>
<tr>
<th>PHYS 10x</th>
<th>Conceptual Physics</th>
<th>Algebra only.</th>
<th>Only starts in AUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 11x</td>
<td>Physics for Life Sciences</td>
<td>Pre-calculus, algebra based</td>
<td>Starts every quarter</td>
</tr>
<tr>
<td>PHYS 12x</td>
<td>Physics for Physical Sci &amp; Engr.</td>
<td>Calculus co-requisite</td>
<td>Starts every quarter</td>
</tr>
<tr>
<td>PHYS 14x</td>
<td>Honors Physics</td>
<td>Calculus I pre-requisite</td>
<td>Only starts in AUT</td>
</tr>
</tbody>
</table>

- No HS prep
- Calc Ready
- HS Phys
- HS Calc
- Honors
- Starts every quarter
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
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 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.
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
You can attend any graduate program that builds on a physics base.

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.
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

52% WORKFORCE

29% GRADUATE STUDY
ASTRONOMY OR PHYSICS

19% GRADUATE STUDY
OTHER FIELDS

Estimated Probability I will ...

- work full time
- work part time
- Phys GS
- Other Sci GS
- Engr GS
- Prof. School
- Teaching
- Military service
- Peace Corps / TFA / etc.
- take time off

Classes of 2017 and 2018 combined

UW Data: Pre-graduation 2020 (200 students)
Which STEM BA/BS end up with STEM job?

CS/Math/Stat
Engineering
Physical Science
Life Science
Psychology
Social Sciences

In which careers do Physical Science BA/BS end up?

Physical Science
Health
Non-STEM
Manager
Finance
Education
Law
Art
Service
Sales
Agriculture

https://www.census.gov/dataviz/visualizations/stem/stem-html/
## Typical Job Titles/Salaries 1 yr Post B.S.

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

### Research & Technical
- Research Assistant
- Research Associate
- Research Technician
- Lab Technician
- Lab Assistant
- Accelerator Operator
- Physical Sciences Technician

### Computer Hardware / Software
- Software Engineer
- Programmer
- Web Developer
- IT Consultant
- Systems Analyst
- Technical Support Staff
- Analyst

---

### What Do New Bachelors Earn?

Starting Salaries for the Class of 2018

- **Computer Science**
- **Engineering**
- **Mathematics**
- **Physics**
- **Registered Nursing**
- **Economics**
- **Finance**
- **Accounting**
- **Business Admin/Mgmt**
- **Architecture**
- **Marketing**
- **Chemistry**
- **Sociology**
- **Biology**
- **Psychology**

Starting Salary in Thousands

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

Reprinted from the Summer, 2017 Salary Survey, with permission of the National Association of Colleges and Employers, Copyright holder.

---

Data from American Institute of Physics (aip.org/statistics)
Who hires physics bachelor’s in Washington State?


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

Graduation 2019

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

Intro Tutorial

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
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: physadvs@uw.edu

To reach us during the COVID-19 shut-down: https://phys.washington.edu/advising-student-services-0
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
# Physics Degree Option Requirements

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

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

<table>
<thead>
<tr>
<th>Core (21 cr)</th>
<th><a href="https://phys.washington.edu/minor-physics">https://phys.washington.edu/minor-physics</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion, Electricity &amp; Magnetism, Oscillations &amp; Waves, Thermal Physics, Quantum Physics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specialization (Pick 1)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics Education (15 cr)</td>
<td>Physics by Inquiry Series</td>
</tr>
<tr>
<td>Experimental Physics (9 cr)</td>
<td>Intro Laboratory Analysis Electronics Lab Additional Advanced Lab</td>
</tr>
<tr>
<td>Mathematical Physics (12 cr)</td>
<td>Math Physics I and II: Phys 227, 228 Either Electricity &amp; Magnetism (321) or Quantum Mechanics (324)</td>
</tr>
</tbody>
</table>

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

1. Complete PHYS 123 and MATH 126.
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.
   • 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
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
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
What type of job do you envision having in 10-15 years? (check all that apply)

- R&D in government lab
- R&D in industrial lab
- Prof. at research university
- Prof. at 4-yr college
- Prof. at 2-yr college
- K-12 Teacher
- Engineer
- Computer/IT/Data Science
- Tech-support
- Technology transfer
- Medicine / medical phys
- non-STEM job
- Military
- Lawyer
- Pilot/astronaut
- Other

I haven't thought that far ahead.
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
What factors impacted your ability to graduate in four years from starting college (at UW or elsewhere)?

- I have changed majors or chosen a major late.
- There are too few credits given per required core physics course.
- Health or other personal problems slowed my progress.
- I have been delayed by inability to enroll in physics classes that I...
- I have been delayed by inability to enroll in non-physics classes...
- I took fewer courses each quarter so that I could get better grades.
- I am pursuing two or more majors/degrees
- I have been unable to take full course loads due to financial needs.
- There were not enough physics classes offered at my previous...
- I took some time off for travel or other non-work opportunities.

Of Minor Importance  | Somewhat Important  | Reasonably Important  | Very Important

- Something else
  - 25%
  - 50%
Preparation for our program

How well did your educational experiences prior to UW prepare you for the skills and knowledge needed to succeed in your UW physics courses?

- scientific reasoning
- problem solving skills
- math knowledge
- organizational skills
- physics knowledge
- study skills
- time management skills

Choose one:
- very underprepared
- underprepared
- adequate preparation
- good preparation
- more than I needed