Physics Advising
Planning your Academic Path

What is your plan?

"Four decades ago, a liberal arts education was thought to prepare one well for any professional endeavor; the specific course work may have been irrelevant, but the education process instilled intellectual discipline and sobriety...Physics is the liberal arts education for a technological society."

(Joseph M. Pimbley, Physics Today, January 1997, p. 46)
The value of a Physics Degree

What’s a Bachelor’s Degree Worth?
Typical Salaries for Bachelor’s Degree Recipients, Class of 2016

Bachelor’s Field
- Computer Science
- Aerospace Engineering
- Physics
- Chemical Engineering
- Electrical Engineering
- Mathematics
- Mechanical Engineering
- Finance
- Civil Engineering
- Registered Nursing
- Accounting
- Business Admin/Manage
- Chemistry
- Psychology
- Biology

Starting Salary in Thousands

Note: Typical salaries are the middle 50%, i.e., between the 25th and 75th percentiles.
Reprinted from the Spring 2016 Salary Survey, with permission of the National Association of Colleges and Employers, copyright holder.

Physics Career Paths

Physics Bachelors 1 Year Later
7,430 Recent Degree Recipients

Workforce
- 46%

Graduate Study Astronomy or Physics
- 32%

Graduate Study Other Fields
- 22%

Percent
- Private Sector 26
- High School Teaching 4
- College & University 4
- Active Military 3
- Government 2
- Other 2
- Internship, Banking 3

Percent
- Physics 26
- Astronomy 6

Note: Data in this figure are from the AIP Statistical Research Center’s annual Bachelors Follow-up Survey classes of 2013 & 2014 combined. The 7,430 degree recipients represent the average of these two classes. Four percent of respondents in the survey indicated that they had taken US to pursue employment or graduate study and were not included in the figure.

Follow us @AIPStatistics Fall 2016
**Physics Graduate School**

- **BS Physics**
  - Take E&M II, Quantum II, Physics Research
  - Summer REU Programs
  - Advanced Math courses beyond ODE (e.g. PDE)
  - Additional CS courses [as Gen Ed Science Sequence]
  - Physics LA / tutor to reinforce intro material [Restricted Elective]

- **BS Biophysics (Biophysics Grad School)**
  - Summer REU Programs
  - Physics LA / tutor to reinforce intro material [Restricted Elective]

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**Applied Physics/Related Field**

- Biomedical Physics or Medical Physics
  - **BS Biophysics**
  - **BA Physics**
    - Bio and Chem courses

- Bioinformatics
  - **BS Biophysics**
  - **BA Physics**
    - Bio and Chem courses; Stats courses; CS courses

- Astronomy/Astrophysics
  - **BS Physics**
    - CS courses; Astronomy Minor; Summer REU

- Meteorology
  - **BS or BA Physics**
    - Advanced Math and CS courses, Geology courses

- Geology
  - **BS or BA Physics**
    - Advanced Math and Chem courses; Geology courses

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*Know the grad school admission requirements!!!!!*
High School Teaching

- **BA Physics** followed by MA STEM Education
  - Can complete Physics BA in three years and move into the MA early
- Attend Workshop for HS Teaching
- Know your certification options
- Substitute teach
- Work in Physics Lab rooms or as Physics LA
  - Taking the LA for credit twice = 1 upper-level Physics Elective
- Volunteer in schools—outreach with Physics Club
- **Map** out your courses carefully with both Physics and Education advisors

Job in Industry

You will have very keen and highly developed problem solving skills.

- **BA or BS in Physics**
- Might need a “skill” to get that first job
  - Computer science programming or network talent
  - Background in business
  - Rich experience using advanced equipment
  - Take lab, 'hands-on' courses: Optics, Electric Circuits, Physics Research
- Consider a Minor or CUGS to document “skill”
- Network!
  - Apply for Industrial Internships at area companies
  - Look for a “Rowan connection” (attend Alumni Day in Spring)
  - Attend Rowan Career Fairs
- Consider semester abroad for international experience
Field of Employment for Physics Bachelors in the Private Sector, Classes of 2013 & 2014 Combined

- Engineering: 36%
- Computer or Information Systems: 23%
- Non-STEM: 25%
- Other STEM: 13%
- Physics or Astronomy: 5%

STEM refers to natural science, technology, engineering, and mathematics.
Figure is based on 1,141 responses

www.aip.org/statistics

Knowledge and Skills Regularly Used by Physics Bachelors Employed in the Private Sector, Classes of 2013 & 2014 Combined

- Solve Technical Problems
- Work on a Team
- Perform Quality Control
- Technical Writing
- Use Specialized Equipment
- Manage Projects
- Knowledge of Physics or Allied Design & Development Programming
- Work with Customers
- Advanced Math
- Simulation or Modeling
- Manage People
- Manage Budgets

Percent Regularly Using Knowledge or Skill

Employment in Engineering
Employment in Computer Science or Information Technology

Percentages represent the physics bachelors who chose "daily," "weekly," or "monthly" on a four-point scale that also included "never or rarely."
Figure based on the responses of 287 physics bachelors employed in private sector engineering positions and 215 physics bachelors employed in private sector computer science positions.

www.aip.org/statistics
+ Engineering Graduate Study

- BS Physics or a rigorous BA
  - With additional related Engineering, Math, CS courses.
- Know the admission requirements!
- Minor in Mechanical Engineering or Electrical and Computer Engineering


+ Medical School

- Go to Pre-med advisor (varela@rowan.edu)
- BA Physics or BS Biophysics
- Basic requirements on top of BA
  - 1 year Biology, 1 year Chemistry, 1 year Organic Chemistry, 1 year Physics, advanced Biology course
- Need more
- Continued service or activity showing your promise and commitment
- Research in medical field during academic year and Summer REU
- Join Rowan's Pre-professional club
Law School

- **BA or BS Physics**
  - Unique, and needed, background for law (e.g. patent law)
  - Need critical thinking skills and writing skills
  - Consider double majoring or minor with a field that interests you that will help you gain these skills (History, English, Philosophy, Sociology, Law/Justice…)

- Join Pre-Law club—go to the Law School Fair in the fall (and don’t wait until your senior year!)

- LSAT prep

Planning the Major
Fr/So Math & Science Courses

- Calculus I, II, III
- Intro Mechanics, Intro TFWO, Intro E&M, Modern
- Science Sequence
  - Chemistry I (CHEM06.100), Chemistry II (CHEM06.101)
  - Any two of Object-Oriented Programming (CS04.113), Data Abstraction (CS04.114), Computer Organization (CS06.205)
- Intro to Scientific Programming*
- Get a jump on upper level: Analytical Mech in So Spring

Sequence

<table>
<thead>
<tr>
<th>Fall Freshman</th>
<th>Spring Freshman</th>
<th>Fall Sophomore</th>
<th>Spring Sophomore</th>
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<tbody>
<tr>
<td>Calc I</td>
<td>Calc II</td>
<td>Calc III</td>
<td>Ord Diff Eqn</td>
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<tr>
<td>Intro Mech</td>
<td>Intro TFWO</td>
<td>Intro E&amp;M</td>
<td>Modern Phys</td>
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<tr>
<td>Intro Sci Prog</td>
<td>Sci Seq 1</td>
<td>Sci Seq 2</td>
<td>Phil Sci (WI,M/G)</td>
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<tr>
<td>Comp I</td>
<td>Comp II</td>
<td>Lin Alg</td>
<td>ACE</td>
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</tbody>
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*If you are “behind” consider taking Calc II in summer between Fr and So years*
Why Modern Physics
Sophomore Spring?

To get ready to begin the upper level sequence in the Fall of your junior year

<table>
<thead>
<tr>
<th>Fall Junior</th>
<th>Spring Junior</th>
<th>Fall Senior</th>
<th>Spring Senior</th>
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<tbody>
<tr>
<td>Any 2 of: Analyt Mech</td>
<td>Other 2 of Analyt Mech</td>
<td>Advanced Lab</td>
<td>Stat Physics</td>
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<tr>
<td>E&amp;M I QM I</td>
<td>E&amp;M I QM I</td>
<td>Res/Phys Elective (e.g. PDE or QM II)</td>
<td>Phys/Res Elective (e.g. E&amp;M II or PDE)</td>
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<tr>
<td>Phys Elective</td>
<td>Phys Elective</td>
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BS or BA?
Courses beyond the “Core”

<table>
<thead>
<tr>
<th>BS Physics</th>
<th>BA Physics</th>
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<tbody>
<tr>
<td>Calculus III</td>
<td>Calculus III</td>
</tr>
<tr>
<td>Linear Algebra</td>
<td>Physics Elective 300+</td>
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<tr>
<td>Ordinary Differential Equations</td>
<td>Physics Elective 300+</td>
</tr>
<tr>
<td>Analytical Mechanics</td>
<td>Physics Elective 300+</td>
</tr>
<tr>
<td>E&amp;M I</td>
<td>Approved Physics or Astronomy*</td>
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<tr>
<td>Quantum Mechanics I</td>
<td>Career Track</td>
</tr>
<tr>
<td>Statistical Physics</td>
<td>Career Track</td>
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<tr>
<td>Advanced Lab</td>
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<td>Physics Elective 300+</td>
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<tr>
<td>Physics Elective 300+</td>
<td></td>
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<tr>
<td>Restricted Elective</td>
<td></td>
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*If going for teaching cert, physics or astrophysics only
TMI and still not sure?

- [http://www.bls.gov/bls/occupation.htm](http://www.bls.gov/bls/occupation.htm)
- [http://www.spsnational.org/cup/](http://www.spsnational.org/cup/)

Most people don’t know what they want to do, but there are ways to find out

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Physics at Rowan: Learn by Doing

Through performing research, you can:

- Integrate the abstract knowledge from the classroom with real-world experiences
- Co-author publications in international journals (while at Rowan)
- Gain marketable evidence that you have developed high level analytical skills
- Secure excellent recommendation letters from faculty based on performed in these one-on-one projects

"Luck is what happens when preparation meets opportunity."

[Rowan University]
Hands-on Experience
Use Advanced Instrumentation

Rowan’s Physics program houses advanced research equipment that students routinely use including:

- **Scanning Electron Microscope**
  - See features down to a few nanometers
  - (1/1000\textsuperscript{th} of the diameter of a hair)

- **Atomic Force Microscope**
  - See with atomic resolution

- **X-ray Diffraction**
  - Measure the spacing between atoms in your sample