New Student Pizza Party!

Merissa Jones (+70 pizzas)

New students plus peer mentors
PHYSICS ILLINOIS GRADUATES (2011-2013)

- Physics/Astr Grad School: 40%
- Other Grad School: 28%
- Jobs: 25%
- HS Teaching: 5%
- Military: 2%

Oct 2013
### Jobs

- Accenture Consulting
- Belvedere Trading
- Chicago Tech Academy
- CISCO Systems
- Creat-a-Soft
- Crystal Lake Central HS
- Department of Defense
- Elk Grove HS
- Epic
- Google
- Green Line Engineering
- HRL Labs
- IBM
- IMC Finance
- Inservice Engineering
- Intel
- Jump Trading
- Lake Forest Academy
- Olenick & Associates
- Qualcomm
- Simplex Investments
- Studio 222
- Twitch LLC
- U-Line Distributor
- U.S. Military
- Viasat

### Graduate Schools

#### Areas

- Physics
- Applied Physics
- Applied Statistics
- Architectural Acoustics
- Biomedical Engineering
- Computer science
- Electrical Engineering
- Finance
- Geophysics
- Journalism
- Law School
- Material Science
- Mathematics
- Neuroscience
- Nuclear Engineering
- Secondary Education

#### Schools

- Caltech
- Case-Western
- Colorado
- Cornell
- Florida
- Harvard
- Indiana
- Johns Hopkins
- Maryland
- Michigan
- Michigan State
- Minnesota
- MIT
- Northwestern
- Notre Dame
- Ohio State
- Ohio University
- Oxford
- Penn State
- Princeton
- Stanford
- U Chicago
- UIUC
- University of California
- Virginia
- Washington
- Wisconsin
Our mission is to serve the people of the State of Illinois, the nation, and the world through leadership in physics research, science education, public outreach, and professional service.
Physics at the University of Illinois

Featuring world leading research in:

- Astrophysics
- Atomic and Molecular Optics
- Biological Physics
- Complex Systems
- Condensed Matter
- Cosmology
- High-Energy Physics
- Nuclear Physics
- Physics Education
- Quantum Information

Close research ties with:

- National Center for Supercomputer Applications (NCSA)
- Fermi National Accelerator Laboratory
- Argonne National Laboratory

Oct 2013

physics.illinois.edu
Physicists at the University of Illinois

National Rankings:

- Ranked #8 overall (two surveys)

- Other national rankings:
  - #2 in condensed matter physics
  - #7 in quantum information
  - #8 in nuclear physics
  - #12 in elementary particle physics

- Ranked #1 in the nation in undergraduate engineering physics
Engineering Science / Engineering Physics Rankings

Engineering science and engineering physics combine multidisciplinary principles including math and physics. These are the top undergraduate schools where the highest engineering degree offered is a doctorate.

University of Illinois--Urbana-Champaign
Champaign, IL

Founded in 1867, University of Illinois--Urbana-Champaign is a public institution. University of Illinois--Urbana-Champaign follows a semester-based academic calendar and its admissions are considered more selective.

Get access to expanded profiles, financial aid statistics, GPAs and more.
Physics

- What is physics?
- Research areas
- Academic programs
- Careers
Physics at the University of Illinois

Excellence in research, education and outreach

Oct 2013

physics.illinois.edu
"The most incomprehensible thing about the world is that it is comprehensible."
What is physics?

- Physics is the science of matter, energy, space, and time.

- We ask questions like why? and how?

- We study things ranging from the universe to atoms, from music to cells.

- In trying to answer these questions, we learn about how nature works and how we can develop new technologies.
Atomic and Molecular Optics

- Study of the behavior of atoms and light.
  - Quantum computing
  - Quantum encryption
  - New states of matter

First Dysprosium MOT
(\textsuperscript{164}Dy, \textsuperscript{163}Dy, \textsuperscript{162}Dy, \textsuperscript{161}Dy, & \textsuperscript{160}Dy)
LevLab, UIUC, 4/10/09, 5:05 pm
Biophysics

▪ How do living systems work?
▪ Relevance
  – Disease mechanisms, drug development
High Energy/Nuclear Physics

Studying nature at its smallest level
Condensed Matter Physics

- Studying properties of materials like semiconductors, superconductors, systems of many particles.
Introductory Courses

- **Introductory sequence (3 semesters)**
  - PHYS 211 -- Mechanics
  - PHYS 212 -- Electricity and Magnetism
  - PHYS 213 -- Thermal Physics (half-semester)
  - PHYS 214 -- Waves and Quantum Physics (half-semester)
  - PHYS 225 -- Relativity and Math Methods (new)

Notes:
- Take Phys 225 the same semester you take Phys 212
- Phys 213 and 214 are two half-semester courses (for practical purposes, it’s a single four hour course)
Upper level Courses

- "Core" physics
  - Classical mechanics
  - Electricity and magnetism
  - Quantum Mechanics
  - Thermodynamics and statistical physics
  - Classical laboratory
  - Modern laboratory

- Subject areas
  - Biophysics
  - Condensed matter physics
  - Subatomic physics
  - Atomic physics
  - Light/optics laboratory
  - Physics of music
  - Plasma/fusion

- Capstone
  - Intro to physics research
  - Senior thesis
In Modern Physics Lab, you might...

... catch some muons from cosmic rays and measure how long they live

Answer: 2 millionth's of a second
Elective Options

- Allows students to tailor curriculum to their needs and interests.
- Examples:
  - Professional Physics *(this is the grad school track)*
  - Astrophysics
  - Biophysics
  - Bioengineering
  - Computational Physics
  - Materials Science
  - Physical Electronics
  - Earth Science
  - Science Writing
  - Pre-law
  - Pre-med
Engineering vs. LAS Physics

- Same programs available through both colleges.
- Differences in gen ed and foreign language.
- Math, physics, technical courses all the same.

To transfer into physics.
- Follow the guidelines of the college (LAS/Engineering)
- Follow the instructions here: http://physics.illinois.edu/undergrad/transfer-in.asp
- Visit the chief academic advisor
- We want to see your grades in PHYS 211-225, Calc I-III
- Take PHYS 225 the same semester you take PHYS 212!!
Undergrad Research

- An important component of your education

- Summer 2013
  - 120 undergrads doing research in physics
Undergrad Research Poster Session
Undergrad Research Symposium

Oct 2013
Teaching Option

- If you are interested in teaching high school physics
  - Program offered through Liberal Arts and Sciences in conjunction with the College of Education
  - Must complete a secondary education minor

- Great program, but not offered through Engineering College
- Contact advisor Prof. Mats Selen (mats@illinois.edu)
Physics Minor

- Phys 211  Mechanics (4 hrs)
- Phys 212  Electricity & Magnetism (4 hrs)
- Phys 213  Thermo or Phys 214 Quantum (2 hrs)
- Phys 225  Relativity and Math Methods (2 hrs)
  - Try to take this when you take calc II or calc III
- Phys 325  Intermediate Mechanics (3 hrs)
- Two other 300/400-level physics courses
  - Phys 419/420 excluded
  - Upper level E&M, Quantum, Thermo, condensed matter, Biophysics, optics, subatomic physics, etc.
Student Environment

- **Physics Society**
  - [http://physoc.physics.illinois.edu/](http://physoc.physics.illinois.edu/)

- **Society for Women in Physics**
  - [http://physics.illinois.edu/groups/WIPHYS/](http://physics.illinois.edu/groups/WIPHYS/)

- **Physics Van**
  - [http://van.physics.uiuc.edu/](http://van.physics.uiuc.edu/)
Careers in Physics
Class of 2013

- Total number of graduates: 60
- Physics grad school: Minnesota, Maryland, Michigan, MIT, Princeton, Case-Western, Ohio University, UIUC, U Chicago, Virginia, Johns Hopkins
- Other grad school: MatSE, Finance, Applied Stats, Law, Geophysics, ECE, Journalism, CS, Math, Nucl Eng
- Jobs: Viasat, Studio 222, IMC Finance, EPIC (2), Inservice Engineering, Creat-a-Soft, U-Line distributor, Qualcomm, Google, Twitch LLC, HS teaching (3), software startup, Jump Trading, Green Line, Olenick & Associates
- Several people “looking” taking a “gap year” or staying here for a year of research.
Class of 2012

About 60 grads, where did they go?


- Related fields: economics, applied physics, architectural acoustics, biomedical engineering, secondary education, law school, neuroscience, astronomy and materials science

- Jobs: software firms, the Department of Defense, IBM, Google, and HRL Labs
About 55 grads, where did they go?

- **50% grad school in physics**
  - **Fields:** Atomic and molecular optics, biophysics, high energy physics, astrophysics, condensed matter physics, quantum computing, nuclear physics, nanotechnology.

- **20% grad school in other field (CS, EE, NuclE, MatSE, Math)**

- **20% industry**
  - Software engineer (CISCO Systems), manufacturing systems (Intel), information technology (Simplex Investments, Accenture Consulting), finance (Belvedere Trading Company), public policy.

- **5% teaching**

- **5% military (service or teaching)**
Field of employment for physics bachelor’s in the private sector, classes of 2006 & 2007.

- Engineering: 32%
- Computer Science or Information Technology: 16%
- Non-STEM: 29%
- Other Technology: 7%
- Other Natural Sciences: 5%
- Physics or Astronomy: 9%
- Math: 1%
- Science Education: 1%

STEM: Natural Science, Technology, Engineering and Math

http://www.aip.org/statistics
### What Do Physics Bachelors Do?

<table>
<thead>
<tr>
<th>Type of Job</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software</td>
<td>24</td>
</tr>
<tr>
<td>Engineering</td>
<td>19</td>
</tr>
<tr>
<td>Science &amp; Lab Technician</td>
<td>9</td>
</tr>
<tr>
<td>Management, Owner &amp; Finance</td>
<td>20</td>
</tr>
<tr>
<td>Education</td>
<td>12</td>
</tr>
<tr>
<td>Active Military</td>
<td>6</td>
</tr>
<tr>
<td>Service and Other Non-Technical</td>
<td>10</td>
</tr>
</tbody>
</table>

Type of employment of physics bachelors 5 to 7 years after earning their degrees, 1999.

Source: 1998 Bachelors Plus Five Study

### What's a Bachelor's Degree Worth?

Typical Salaries Offered by Campus Recruiters, 2002-2003

<table>
<thead>
<tr>
<th>Bachelor's Field</th>
<th>Starting Salary in Thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Engineering</td>
<td>30</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>40</td>
</tr>
<tr>
<td>Computer Science</td>
<td>35</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>25</td>
</tr>
<tr>
<td>Physics</td>
<td>50</td>
</tr>
<tr>
<td>Mathematics</td>
<td>30</td>
</tr>
<tr>
<td>Chemistry</td>
<td>25</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>20</td>
</tr>
<tr>
<td>Accounting</td>
<td>15</td>
</tr>
<tr>
<td>Finance and Economics</td>
<td>10</td>
</tr>
<tr>
<td>Bus. Admin. / Management</td>
<td>5</td>
</tr>
<tr>
<td>Marketing</td>
<td>6</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>5</td>
</tr>
<tr>
<td>Biology / Life Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Psychology</td>
<td>2</td>
</tr>
<tr>
<td>Secondary Education</td>
<td>1</td>
</tr>
</tbody>
</table>
Skills

- Knowledge and skills rated as important by physics bachelors 5-8 years after graduation

- Solve Technical Problems
- Work on a Team
- Technical Writing
- Knowledge of Phys. or Ast.
- Perform Quality Control
- Manage Projects
- Work with Customers
- Use Specialized Equip.
- Design & Development
- Programming
- Advanced Math
- Simulation or Modeling
- Manage People
- Computer Admin.
- Manage Budgets

Percentages represent the proportion of 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
### Average MCAT Scores by Selected Majors, 2009.

<table>
<thead>
<tr>
<th>Major</th>
<th>Physical Sciences</th>
<th>Biological Sciences</th>
<th>Verbal reasoning</th>
<th>Number of applicants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Engineering</td>
<td>10.9</td>
<td>10.7</td>
<td>9.6</td>
<td>1,005</td>
</tr>
<tr>
<td>Physics</td>
<td>11.1</td>
<td>10.3</td>
<td>9.6</td>
<td>207</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>10.9</td>
<td>10.5</td>
<td>9.4</td>
<td>195</td>
</tr>
<tr>
<td>Economics</td>
<td>10.4</td>
<td>10.5</td>
<td>9.7</td>
<td>566</td>
</tr>
<tr>
<td>Neuroscience</td>
<td>9.9</td>
<td>10.6</td>
<td>9.5</td>
<td>1,066</td>
</tr>
<tr>
<td>Mathematics</td>
<td>10.3</td>
<td>10.1</td>
<td>9.6</td>
<td>374</td>
</tr>
<tr>
<td>English</td>
<td>9.4</td>
<td>9.9</td>
<td>10.3</td>
<td>434</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>9.9</td>
<td>10.3</td>
<td>9.1</td>
<td>2,594</td>
</tr>
<tr>
<td>Chemistry</td>
<td>9.8</td>
<td>9.9</td>
<td>9.0</td>
<td>2,091</td>
</tr>
<tr>
<td>Microbiology (or Bacteriology)</td>
<td>9.0</td>
<td>9.9</td>
<td>8.7</td>
<td>775</td>
</tr>
<tr>
<td>Psychology</td>
<td>8.8</td>
<td>9.4</td>
<td>9.1</td>
<td>2,421</td>
</tr>
<tr>
<td>Biology</td>
<td>8.7</td>
<td>9.5</td>
<td>8.7</td>
<td>12,705</td>
</tr>
<tr>
<td>Premedical</td>
<td>8.3</td>
<td>9.0</td>
<td>8.4</td>
<td>663</td>
</tr>
<tr>
<td>All Majors</td>
<td>9.2</td>
<td>9.8</td>
<td>9.0</td>
<td>41,487</td>
</tr>
</tbody>
</table>

The Medical College Admissions Test (MCAT) has three sections of standardized multiple choice questions (total of 219 items) with an additional writing sample comprised of two essays. Scores of 9.5 to 11 in each section are considered competitive by most medical schools.

Source: Association of American Medical Colleges, Data Warehouse

http://www.aip.org/statistics
### Average LSAT Scores* by Selected Majors, 2009.

<table>
<thead>
<tr>
<th>Major</th>
<th>Mean score</th>
<th>Number of applicants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>161.5</td>
<td>180</td>
</tr>
<tr>
<td>Mathematics</td>
<td>159.7</td>
<td>336</td>
</tr>
<tr>
<td>Economics</td>
<td>157.4</td>
<td>3,047</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>156.3</td>
<td>546</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>156.0</td>
<td>427</td>
</tr>
<tr>
<td>Chemistry</td>
<td>155.7</td>
<td>355</td>
</tr>
<tr>
<td>English</td>
<td>154.7</td>
<td>5,120</td>
</tr>
<tr>
<td>Biology</td>
<td>154.5</td>
<td>1,055</td>
</tr>
<tr>
<td>Computer Science</td>
<td>154.0</td>
<td>682</td>
</tr>
<tr>
<td>Political Science</td>
<td>153.0</td>
<td>14,964</td>
</tr>
<tr>
<td>Psychology</td>
<td>152.5</td>
<td>4,355</td>
</tr>
<tr>
<td>Pre Law</td>
<td>148.3</td>
<td>1,078</td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>145.5</td>
<td>3,306</td>
</tr>
<tr>
<td><strong>All Majors</strong></td>
<td><strong>152.6</strong></td>
<td><strong>81,530</strong></td>
</tr>
</tbody>
</table>

*The scores in the table are for individuals who applied to Law school for the 2007-08 academic year. All test takers are not represented. Individuals may have taken the LSAT months or possibly years earlier.

Source: AIP Statistical Research Center compiled data from the Law School Admission Council, Newton PA.

http://www.aip.org/statistics
Graduate School: Who/What/How?

- Grad school may be for you if you want to...
  - do research and development
  - work at a national laboratory
  - teach/research at the college/university level.

- Duration
  - 1-2 year Master’s, 5-6 year Ph.D.

- Grad school
  - Typically get remitted tuition + ~$20k per year
  - Two years of course work (+ teach + research)
  - Three-four years of research + dissertation
More About Our Courses

Go to:
http://physics.illinois.edu/

Under info for undergraduates:
– Curricula/Programs

Course web pages:
http://physics.illinois.edu/courses/
More about careers

CAREERS IN PHYSICS, PARTS 1-10

By Kevin Pitts
August 31, 2012

Over the past year, I’ve posted many times about potential career paths. It might be hard for new readers to follow the older threads, so this post is an "index" of career posts. Several of these posts came from guest bloggers. Here is one example of the need for people trained in science.

Careers in Physics

Part I  Job skills What skills do employers want that physics majors have?
Part II  Elective options What are my curriculum choices for different career paths?
Part III Law Ever consider a career as an attorney? Physics is a good path to the law.
Part IV  Salaries How much can you expect to make with a physics degree?
Part V  Public service Many scientists work for the government.
Part VI  The mysterious missing blog post
Part VII Atmospheric science Weather and climate are all physics.
Part VIII Medical imaging CT scans, MRI, PET scans, radiation therapy, all physics.
Part IX Teaching physics We need more high school teachers! More on this here.
Part X  Music Acoustical engineering, architectural acoustics.

Other posts of interest:

Internships A great way to get experience.
Career fairs Learn about what’s available and market yourself.
Are there really jobs in physics? Answer is yes.
Summer research here and here A different kind of internship.

I have many more to come, so this is by no means the end of the list. We may never know what happened to the mysterious 6th post, but I will keep trying to update this post when I add more parts to this series.

If you have questions about the Physics Illinois Undergraduate Program, contact the Undergraduate Office, 217.333.4361.

If you have any feedback or suggestions for this blog, please contact Kevin Pitts.

http://physics.illinois.edu/undergrad/posts.asp
Summary

- Physics provides an outstanding education in:
  - Fundamental science and the underpinnings of engineering
  - Detailed analysis and problem solving
  - Mathematical analysis
  - Working in teams
  - Laboratory and instrumentation skills
  - Learning new things and adapting to new technologies
  - Modeling of complex systems

- Career options are extremely flexible
  - We are working with Eng Career Services to educate prospective employers about the benefits of hiring physicists