Undergraduate Physics at the University of Illinois

Agenda:
• Welcome
  Lance Cooper, Assoc. Head
• University housing overview
  Mari Anne Brocker
• IEFX - Freshman Experience
  Bruce Litchfield
• Break
• Study abroad
  Erica Mui
• Physics careers
  Kevin Pitts
• Financial aid
  Keith Cornelius
• Parallel
  • Parents: financial aid Q&A
    Matt B., Shannon G.
  • Students: university life
• Lunch - meet students and faculty
  Kevin/Marissa
• Physics curriculum
• Question and answer period
• Parallel
  • Tour PHYS 403 lab
    Prof. Eugene Colla
  • More Q&A
• Adjourn
Undergraduate Degree Programs

- Engineering Physics
  - Offered through Engineering College
- Science and Letters Physics
  - Virtually identical to Engineering Physics
- Specialized Physics
  - Most flexible physics curriculum
- Physics Teaching Option
  - Includes secondary education minor
    (and teaching certification)
Engineering Physics

- Offered through College of Engineering
- 128 Hours required to graduate
- Curriculum features: “Elective Options”
  - [more on this in a minute]
- Graduate school or industry track
- 3 years HS foreign language or 3 college semesters satisfies language requirement
LAS Science and Letters Physics

- Offered through College of Liberal Arts and Sciences
- Curriculum features: “Elective Options”
  - [more on this in a minute]
- 120 hours required to graduate
- Graduate school or industry track
- 4 years of HS foreign language or 4th-semester college language satisfies language requirement
LAS Specialized Physics

- Offered through College of Liberal Arts and Sciences
- 126 hours required to graduate
- 4 years of HS foreign language or 4th-semester college language satisfies language requirement
- "Option-oriented" curriculum (ideal for pre-med, pre-law, and physics related fields)
- Very flexible in upper-level courses
LAS vs. Engineering

Q: What’s the difference between LAS Science and Letters and Engineering Physics?

A: Nothing in the physics + math curriculum.
  – LAS physics majors must pay the college of engineering college surcharge. (They utilize all of the same equipment/infrastructure.)
  • LAS/Engineering have slightly different general education requirements.
  • LAS requires 4th semester of foreign language.
  • Engineering requires a few more hours.
  • Is one “more prestigious” than another?
  – Not for grad school...maybe in the job market?
Degree Requirements

- “Core” Physics Courses
- “Core” Math courses
  (+2 courses = math minor)
- Supporting courses (Chem, CS)
- General Education requirements
- Elective Options
- Free electives
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

- **Notes:**
  - Courses have calculus prerequisites
  - 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)

- **What if you change your mind?**
  - Calculus and PHYS 211-214 are required for most engineering majors.
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)

- **Course format:**
  - Lecture, discussion (interactive problem-solving), labs
  - Lectures are highly interactive using iClickers

- **New for fall 2011:**
  - Physics major-only discussion sections
  - Register for one of these if you can, it’s ok if you can’t
  - Help to build a sense of community with our majors
  - Cover additional material when appropriate
Advanced Courses

Some courses required, many are optional

- Classical Mechanics (2)
- Electricity and Magnetism (2)
- Thermal and Statistical Physics
- Quantum Mechanics (2)
- Classical Physics Laboratory
- Modern Physics Laboratory
- Physics of Music Laboratory
- Condensed Matter Physics
- Atomic Scale Simulations
- Biophysics
- Subatomic Physics
- Atmospheric Dynamics
- Electronic Circuits
- Introduction to Physics Research
- Senior Thesis
- Light (optics)
- Independent Study

all courses offered every semester or every other semester.
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
  - User defined

New options coming:
- Nuclear physics
- Energy/sustainability
- Management
- Atmospheric science
- ...
Recent user defined options

- Electrical Engineering Technical Option
- Geology/Geophysics
- Pre-Optometry
- Mathematical Physics
- Prep for Grad School in Library Science
- Economics
- Acoustic Engineering
- Atmospheric Sciences
- Acoustics
- Biomedical Engineering
- Nuclear Physics
- Sustainable Technology Commercialization
<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>
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<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>
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<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><strong>All Majors</strong></td>
<td><strong>9.2</strong></td>
<td><strong>9.8</strong></td>
<td><strong>9.0</strong></td>
<td><strong>41,487</strong></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>
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<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>
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<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](http://www.aip.org/statistics)
Teaching Option

- Offered through Liberal Arts and Sciences in conjunction with the College of Education
- Must complete a secondary education minor
- Apply to Science and Letters Physics (then tell us you are interested in teaching option after admission)
Academic Advising

- Every major is assigned an advisor and a faculty mentor
  - Advisor is the expert on courses/programs/graduation requirements
  - Mentor is the faculty member, expert on research/areas of study/careers

- Required to meet academic advisor and mentor until PHYS 325 is taken

- We are working on some new programs to further aid the mentoring process.
More on Advising

- Each student is assigned a faculty “mentor”
  - Get to meet the mentor during first year
  - Degree to which you use the mentor is up to you

- New for Fall 2012: we are going pair freshmen up with an upperclass student
  - They can help you learn the “things you need to know”
More About Us

Curricula/Programs:
http://physics.illinois.edu/undergrad/curricula.asp

Course web pages:
http://physics.illinois.edu/courses/

Academic advising:
http://physics.illinois.edu/undergrad/advising.asp
Physically Speaking (Blog)

Filter blog posts: View latest 15 posts ▼

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2/7/2012
11th Annual Undergraduate Research Symposium
Undergraduates give presentations on their research!

Kevin Pitts

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2/7/2012
Talking Antimatter with the Satyward Scholars
Talking to 700 high school students about antimatter is an interesting experience!

Kevin Pitts

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2/2/2012
Get Physically Speaking Updates Via Twitter
Follow me on Twitter and I'll tell you when I update the blog.

Kevin Pitts

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1/26/2012
The Undergraduate Women in Physics Conference Rocks!
One of our undergraduate students tells us what a great time she had at the conference.

Shannon Glavin

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1/25/2012
Welcome to Merissa, our new Academic Advisor
A guest blog post about academic advising from Merissa.

Merissa Jones

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1/14/2012
Undergraduate Women in Physics Conference
Young physicists across the country are getting together this weekend!

Kevin Pitts

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1/9/2012
Rankings
Rankings can be useful, but don't put too much stock in them.

Kevin Pitts
PHYS 199REL The Relevance of Physics

- Offered FALL 2014!!
- For Physics majors only
- Discuss the societal relevance of physics...
  - Energy, space travel, nuclear power, weapons, electricity, light, radiation, climate

...and the relevance to physics majors
- Careers, funding, education

- Project-based
  - Career project, poster project, papers, videos.
Discovery Courses

- Freshman-only courses
- Enrollment limited to 19
- Offered in many departments

- Fall 2014 Physics
  - “Behavior of Complex Systems”
  - “Science and Pseudoscience”
  - “Physics of Electronic Musical Instruments”
  - “Sustainable Energy”
Summer registration

- We will help you choose your courses during summer registration. It helps to review our sample schedule and look at the course material before you come.
  - Follow the admitted student checklist. You will be able to select the date for summer registration.

- Make sure to complete all placement exams prior to coming. Take these exams seriously!!!

- You will spend the morning with your college and meet with us in the afternoon.
Extracurricular Activities

Physics Van

Society of Women in Physics

Physics Society
Student Groups

Physics Society
Society for Women in Physics (SWIP)
Physics Van

http://physics.illinois.edu/undergrad/student-groups.asp

- Speaker meetings
- Social gatherings
- Seminars
  - “How to get into grad school”
  - “Careers in Physics”
- Faculty research talks
- Pizza meetings
- Informal dinner with faculty
- Engineering Open House
- Physics demonstrations
Teaching Opportunities

- Upper-class physics majors might have an opportunity to teach!
- It’s a great learning experience
- It looks great on your resume/cv
- Teaching assistants receive stipend
- Typical teaching load is 2 laboratory sections per semester (~8-10 hours/week)
- Our TA’s are good...75% are voted as “excellent” by their students!
Undergraduate Research

- **On campus:**
  - Work in a research lab
    - can earn individual study credit
  - Summer research through senior thesis project

- **Off campus**
  - Research Experiences for Undergraduates (REU)
  - 10 week summer research program
  - Offered at many schools
PHYS 496 Intro to Physics Research

- Explore research fields
- Presentations
- Journal Club
- Introduction to scientific communication
- Oral presentations
- Scientific writing
- Introduction to research basics
- Collaborations
- Ethics
PHYS 499 Senior Thesis

- Writing, presentations
- Poster session
- Symposium
Contact Information

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