

**Illinois State University  
Physics Department  
2006-2011 Strategic Plan**

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## Foreword

This strategic plan was produced by the Physics Department faculty and staff in a series of department meetings during the spring 2006 semester, continued informal discussion in summer 2006, and final sessions at the Physics Retreat on August 17, 2006. The model for the plan layout was that presented by the College of Arts and Sciences. The starting points were the most recent department budget requests, each of which includes a brief discussion of the department's planning priorities. In the course of the meetings discussions were wide-ranging, typically beginning with some suggestions by the Chair, followed by discussion and faculty/staff surveys on specific topics. If no consensus was reached on a particular issue, a vote was taken. The final document was edited by the department Chair and reviewed by faculty and staff, and represents the department's vision for the near future.

## **Illinois State University Physics Department Mission Statement**

*The mission of the Illinois State University Physics Department is to*

1. Provide a high quality undergraduate physics experience, offering physics, computational physics, and physics teaching degrees as well as a dual degree program in engineering and physics, with the goal of becoming the first choice school in physics for Illinois students.
2. Carry out research and scholarship that is recognized on a national and international level.
3. Establish and maintain an undergraduate research program that is second to none nationally by providing a supportive learning environment in which undergraduate students are active participants in forefront research.
4. Maintain the preeminent undergraduate physics teacher education program in Illinois and further establish its national reputation.
5. Maintain and continue to develop effective courses that support the University-wide commitment to general education.
6. Maintain strong ties with other campus entities, local schools, and the wider community, through outreach and public education activities designed to promote scientific literacy and public awareness of our department

### *Discussion*

Based on conferences and publications in the past several years, the department has become aware that our focus area triad of (1) undergraduate research, (2) computational physics, and (3) physics teacher education have become increasingly important on the national scene. The fact that Illinois State was ahead of the game means that we have become one of the leading departments, nationally, in these areas. The department feels strongly that we should continue leadership in these areas while building our expertise and influence in the complementary areas of applied physics and outreach. The mission statement remains general to accommodate both these current and future strengths.

The department also has developed a set of core values (next page), consistent with this mission, designed to provide a foundation for progress in the coming half decade.

**Illinois State University Physics Department  
Core Values Statement**

1. **Student-centered education** – whether in the classroom or in out-of-class research projects and activities, we believe that learning is optimized via close interaction between students and faculty teachers and mentors.
2. **Focused research** – Research and scholarship are central to the academic department. As a small department we will be more effective at generating new knowledge through scientific research by concentrating on a relatively small number of selected research fields rather than dabbling in a wide variety of subfields.
3. **Teacher/scholar model** -- We believe that scholarship informs and motivates teaching and vice-versa.
4. **Collaboration** – We believe that collaboration in scholarship and in teaching can produce synergistic gains that benefit the individuals involved as well as the institution.
5. **Participatory learning** -- involving students in research work, and other out-of-class projects, should be viewed as an integral part of their overall education.
6. **Scientific literacy** – In a democracy in the current technical age, all citizens need to be able to understand basic science and scientific arguments. In addition to training the next generation of scientists and adding to the body of new knowledge, our primary public service is to promote scientific literacy as broadly as possible.
7. **Teacher education** -- Educating future high school physics teachers results in better prepared future college students, future scientists, and citizens.
8. **Flexibility** -- In a rapidly changing society the department needs the ability to adapt planning in response to change and to emerging opportunities.
9. **Collegiality and Diversity** – The Physics Department welcomes individuals with diverse backgrounds and encourages the expression of different perspectives in order to foster a thriving scientific community.
10. **The Honest, ethical practice** of scholarship and teaching are essential in the academic environment and we strive to transmit those principles to our students.

## **Executive Summary of Strategic Goals**

The discipline of physics is both broad and deep, providing on the one hand a foundation for the study of other sciences and technical fields, while on the other hand allowing endless opportunities for focused research into specific areas of new knowledge of our natural world. The natural span of the discipline makes discussion of strategic goals difficult since we are presented with so many avenues that we could move in. In the wide-ranging discussions the department has had in preparing this document, we have explored many of these different roads and settled on the following goals. However, just as scientific research often follows unexpected paths, the first goal makes it clear that we will remain open to unpredicted new opportunities not expressed herein and, thus, the actual state of the department in five years may differ from this prevision.

### ***Goal 1: Flexibility and adaptability***

The department will continue to monitor disciplinary progress in both research and education in order to be able to take advantage of new opportunities consistent with our mission and College and University goals.

### ***Goal 2: Maintain a high level of research and scholarship***

Consistent with our teacher/scholar values, we will continue our tradition of highly productive scholarship.

### ***Goal 3: Undergraduate Research Enhancement***

Undergraduate research is a primary component of the department's reputation and should continue to grow and mature.

### ***Goal 4: Laboratory Improvement***

Laboratory science is fundamental both to the advancement of knowledge and scientific applications and to education. This goal entails both updating laboratory curricula and equipment as well as improving laboratory research.

### ***Goal 5: Enhancement of Physics Teacher Education (PTE)***

The department is already a national leader in PTE and will further cement that leadership position by advancing the program.

### ***Goal 6: Expansion of Applied Physics program***

The department has recently begun to improve both course and research offerings in applied and engineering physics and will move to continue this healthy trend.

### ***Goal 7: Outreach and Public Education***

The department has recently begun to expand its outreach program beyond the ISU Planetarium and will continue this progress in the coming years.

### ***Goal 8: Explore a possible graduate program***

As we near our decade-old goal of becoming the best undergraduate physics department in Illinois, it is time to ask whether a targeted graduate program would be feasible and desirable.

## Goals and Actionable Objectives

### ***Goal 1: Flexibility and adaptability***

This goal is, in some sense, a "meta-goal" and is arguably consistent with all the College Strategies and Educating Illinois goals. On the other hand, actionable items for such a goal are more difficult to discern so we limit ourselves to the following two.

#### *Actions*

- Keep abreast of developments in the field and with a variety of funding agencies so when opportunities arise they can be seized.
- Work to get our people into visible and influential positions to help direct opportunities.

### ***Goal 2: Maintain a high level of research and scholarship***

This goal is in line with the College Strategy Two: *Enhance support for faculty research and creative activity*. and Strategy Five: *Increase the level of external funding*.

The department currently ranks well above the national average in research productivity for primarily undergraduate institution science departments, a strength of the department that should continue or even increase if new faculty are hired. Actionable objectives mainly concern support for scholarly activity, to facilitate the effort to maintain this advantage.

#### *Actions*

- Work to increase professional travel budget so researchers can present their work at national and international conferences and remain connected with collaborators.
- Encourage collaborations within the department and with researchers elsewhere to better leverage our talent.
- Work to maintain or increase all forms of external funding for departmental projects, providing departmental support.

### ***Goal 3: Undergraduate Research Enhancement***

This goal supports College Strategy one: *Enhance the quality of the college's academic programs.*

Out-of-class research experiences are of primary importance in our physics program, giving students experience in small group collaboration, working on open-ended problems, and developing their communication skills – all complementary learning to traditional coursework. The Physics department committed itself to this goal nearly 20 years ago and continues to strive to improve our undergraduate research program.

#### *Actions*

- Enhance support for student research including travel stipends for conference participation and summer stipends for departmental internships.
- Investigate ways of infusing research experiences in to the curriculum.

### ***Goal 4: Laboratory Improvement***

This goal supports College Strategy six: *Enhance the college-wide technology infrastructure to support excellence in scholarship, teaching, and learning.*

Through department, College, and tech-tuition support the department has begun updating its Gen Ed and introductory lab equipment, while at the same time improving lab pedagogy. This process should be taken to completion and a similar enhancement of advanced lab and research lab equipment should be carried out.

#### *Actions*

- Assess the current state of Gen Ed and introductory lab enhancement and plan the next phase of equipment updates and pedagogy improvements.
- Bring experimentalists together to develop a plan for advanced laboratory curricular improvement, generating, in the process, an itemized list of new apparatus necessary to achieve curricular goals.
- Request funding through the annual budget process to support the plan developed through the first two objectives.
- Explore external funding sources for both advance lab equipment and major research lab equipment, with a goal of doing as much experimental research in-house as possible.



### ***Goal 5: Enhancement of Physics Teacher Education (PTE)***

This goal supports College Strategy one: *Enhance the quality of the college's academic programs* and Strategy five: *Increase the level of external funding*.

The Director of the PTE has built the program into one of the best in the country, but he can do no more by himself. To grow the program to its full potential, more people are needed. The action items below address this need.

#### *Actions*

- Hire a new faculty member with teaching and service duties in the PTE program, and research in a complementary area.
- Add additional staff as resources allow: a teacher-in-residence, additional student-teacher supervisors, etc.
- When a 'critical mass' level of faculty/staff in the program is reached, explore grant funding opportunities

### ***Goal 6: Expansion of Applied Physics program***

This goal supports College Strategy one: *Enhance the quality of the college's academic programs* and Strategy five: *Increase the level of external funding*.

Our most recent faculty hire has helped energize our applied physics program, and the department plans to take advantage of this momentum and move the program further. We expect external funding opportunities to be good in applied areas such as energy science, nanotechnology, or laser science – all areas that complement current departmental research.

#### *Actions*

- Hire at least one faculty member with research specialty in applied physics.
- Explore external funding for both major research equipment and laboratory course apparatus.
- With newly hired faculty, develop new specialty courses in applied physics for a degree sequence or a concentration.

### ***Goal 7: Outreach and Public Education***

This goal supports College Strategy four: *Increase engagement with the local and state communities* and Strategy five: *Increase the level of external funding*.

The planetarium, the Physics on the Road program, and competitive projects like the solar car team and the trebuchet team have catapulted the department's public education program in recent years and increased the university's visibility in the community, in schools, and even on the national level. This serves at once to enhance the image of the department and university and aids in recruitment of the next generation of physics students.

#### *Actions*

- Assign a staff member to be coordinator of outreach programs.
- Deepen our current partnerships with community resources such as the Children's Discovery Museum, the Challenger Learning Center, the Twin City Astronomers, and local businesses and civic groups.
- Explore external funding opportunities for outreach and public education projects.

### ***Goal 8: Explore a possible graduate program***

This goal supports College Strategy one: *Enhance the quality of the college's academic programs*, Strategy two: *Enhance support for faculty research and creative activity*, and Strategy three: *Increase the local, state, national, and international visibility of the college's quality programs, student successes, and faculty and staff achievements*.

Up until now, the department has focused its mission on undergraduate education and research and achieved many great things. However, there are some opportunities that would open up to us if we had a graduate program, and a successful graduate program would enhance our national visibility. This major step would require a significant expansion of resource base and faculty effort so should not be undertaken lightly.

#### *Actions*

- Convene a task force to explore possible directions in graduate education that would both play to our strengths and be viable.
- Explore University, state, and federal funding opportunities relevant to a new graduate program in order to assess potential program viability.
- If the task force recommends moving forward with such program, begin to work with the College to develop the resources necessary for its development.

**Assessment of Objectives**

We have attempted to write objectives that were self-evaluating, in the sense that they were written as specific actions that could be later assessed directly. The department will assess progress in achieving objectives and, therefore, progress toward goals each year as part of the annual budget proposal process.