

Making and Sustaining Changes in Undergraduate Physics Programs

1. Active learning techniques, integration of technology tools, and other issues in introductory physics

*-> pre-class assignments (Illinois, Web)

-> Visual python (G. Tech, U. Mich.)

*-> Stanford – interactive recitations (Chair Patricia Burchat, Chaya Nanavati)

-> Colorado, Illinois, G. Tech: Intro physics: Matter & Interactions (Chabay & Sherwood), VPython – modeling

"Study-hall" Thursday - 4 hours; special evening help-center staffed by TAs

2. Flexibility in the undergraduate physics major

Physics faculty members at Stanford have worked with the School of Engineering to introduce an Engineering Physics major.

3. Engaging students in undergraduate research

A common change is to introduce research areas, new research results and research techniques as early as possible in the students' physics careers. The large research-oriented physics departments provide contemporary physics topics for their first-year majors. Methods include direct inclusion of new content in the introductory course, special courses to introduce first-year students to research in the physics department, and scholarships to support first-year students who work in a research lab.

4. The role of laboratories

Michigan State has introduced a new lab course for first-year students. The lab course meets 6 hours per week in sections of 6-8 students, and students can conduct non-cookbook labs in vacuum physics and optics with extensive faculty involvement.

5. Building community

U. Chicago: "Spring interviews" - 1st year - encourage to think about research

Grad school forum (Spring), *Undergraduate Town Hall meeting - to advise us (e.g. faculty)

Cornell: invite students to lunch, *on-line feedback (Google docs)

Dept booklet - success stories, Faculty lunches (once a week?)

6. Sustaining change

Dept is crucial unit for change, not college, not just a few faculty, need large fraction of faculty to be engaged

Tell Dean of plans to improve (PT, Sept 2003)

Future Challenges

- 1. Diversifying physics programs**
- 2. Sustaining change in and emphasis on undergraduate physics programs**
- 3. Career Opportunities for holders of Terminal Bachelor's Degrees in Physics**
- 4. Maximizing the effectiveness of labs**
- 5. Changes in engineering and the health sciences**
- 6. Resources in a challenging economy**