



transforming the Physics major... again! David Roundy Elizabeth Gire Ethan Minot Emily van Zee Corinne A. Manogue

Institutional change research

• Emily van Zee has been studying the change process

http://physics.oregonstate.edu/portfolioswiki/toolkit:start



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Paradigms

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Community college transfer students

- Behind by a few courses when transferring.
- Must be able to finish Physics major in two years.
- Want to reduce extra courseload Fall of junior year.

4-year students

• Challenging transition to upper-division in junior year.

Coupled curricular changes

• Changes in major that could not be made in isolation.

New faculty

- The Paradigms' success came from faculty buy-in.
- Newer faculty lack an understanding of the curriculum.

Paradigms 2.0 process

Information gathering

- Survey of faculty and students.
- Interviews of faculty teaching existing courses.
- Index cards describing concepts and subjects taught.

Card sorting

- Established dependency relationships between cards
- Sorted concepts and subjects into courses
- This resulted in a proposal for a revised set of courses.

Discussion with faculty

- One-on-one meetings with faculty presenting courses.
- This resulted in several revisions.
- One faculty meeting to present final proposal.
- Hallway discussions over one week.
- Faculty meeting to discuss and vote on the proposal.
- Consensus!



Changes made

Physics of Contemporary Challenges

- Replaces *Modern Physics*, but taken earlier.
- Focuses on "real-world" topics important to society.
- Teaches estimation and conceptual reasoning skills.

Techniques of Theoretical Mechanics

- Replaces senior-level classical mechanics, but earlier.
- Teaches mathematical reasoning and sense-making...

Math Methods becomes "Math bits"

• Formal course replaced with just-in-time math.

5-week Paradigms

- Previously our junior-year course were 3 weeks long.
- Maintained 7 hour/week daily schedule.
- Three 2-credit courses → Two 3-credit courses.

Computational Laboratory

• Require our 1-credit computational lab.

Less *Electronics* required

• From 6 credits to 3 credits of electronics required.

More electives

• From 3 credits to 6 credits of upper-division electives.



