

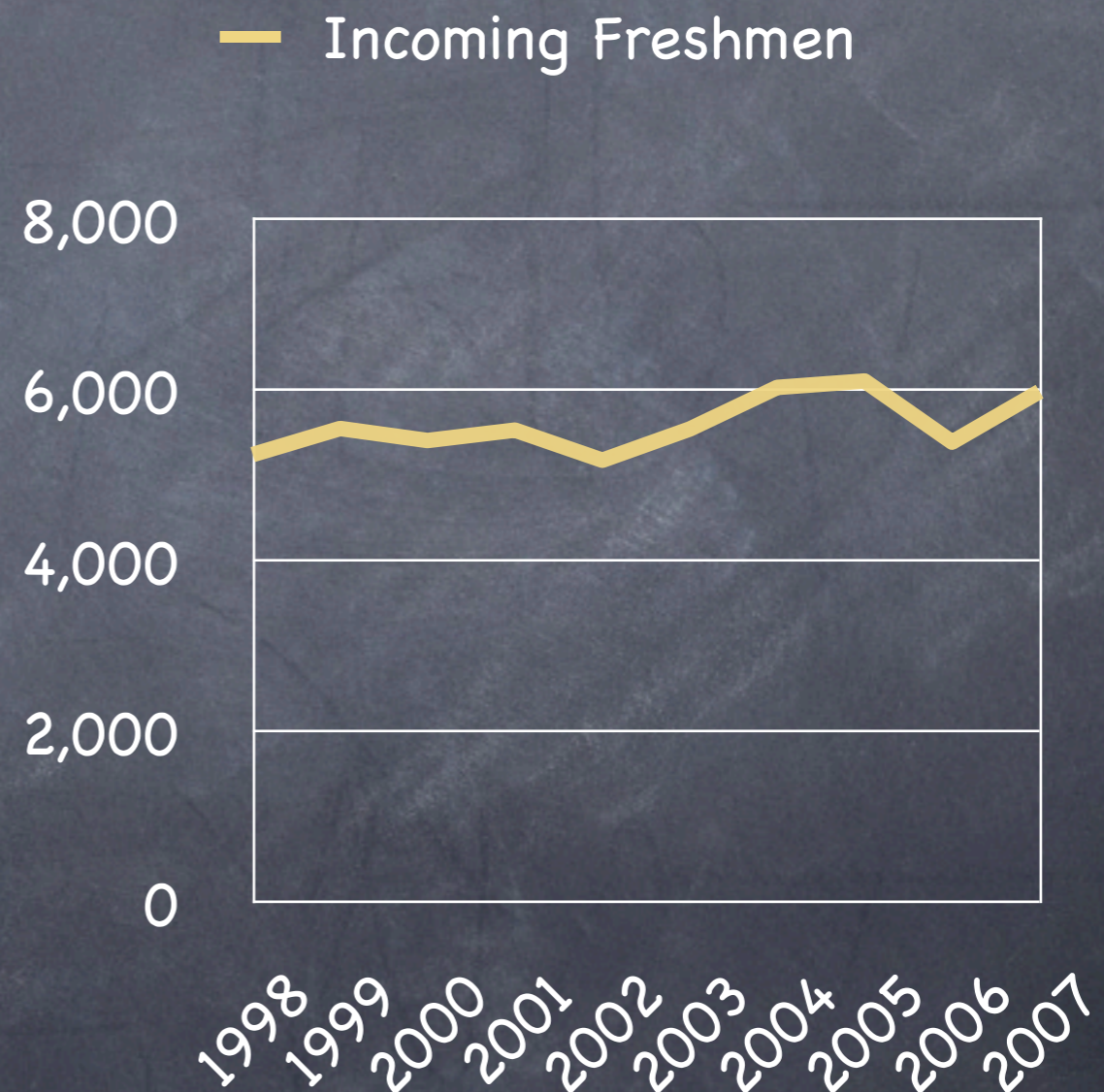
Engaging students in the
introductory physics sequences
at the University of Michigan

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The Michigan undergraduate program

- We are a large public university with about 41,000 students (26,000 UG / 15,000 grad)
- A vast majority of students taking physics do not go on to a physics career
- How do we engage these students?

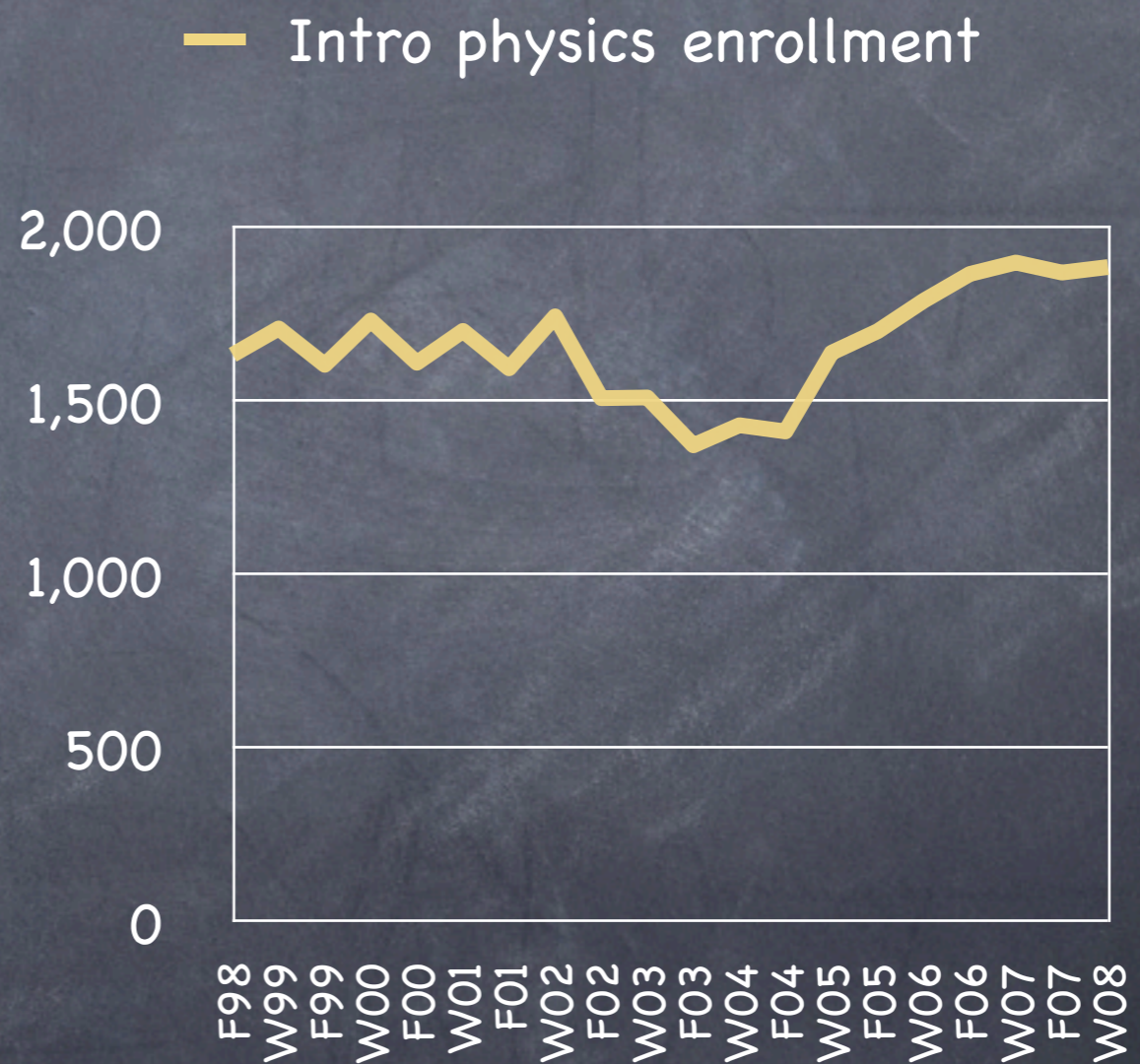


Introductory physics offerings

- We offer four introductory sequences
 - Algebra based (125/126)
 - Traditional calculus based (140/240)
 - Life sciences calculus based (135/235)
 - Honors calculus based (160/260)
- These are complemented with labs
 - Students sign up independently for lecture and lab

Large introductory lecture courses

- We reach about 30% of the undergrads at Michigan
- How we teach physics has a large impact on the students and the University
- Physics enrollments have been increasing over the last 4 years



Engaging students in the large intro lectures

- We follow a traditional schedule of 2 lectures + 2 discussions per week
- Our goal is to promote an active learning environment
 - Integrated lectures, demos and discussions
 - Faculty led discussions
 - Problem solving in peer learning groups
 - Additional support in the Physics help room

Using technology in the classroom

- Course website for announcements, syllabi, lecture slides, discussion problems, etc
- Online homework and online gradebook
 - Automatic grading (faculty)
 - Immediate feedback and multiple attempts (students)
- Student response systems (clickers)

Course website

ctools.umich.edu

Logout

My Workspace | HET Reading Group | Intro Physics Info | LSA-ART | **PHYSICS 125 001 W08** |

- more sites -

- Home
- Announcements
- Resources
- Chat Room
- Syllabus
- Discussion
- Course Info.-FAQs
- WileyPlus
- Registration
- Homework Dates
- Exams
- Physics Help Room
- Physics 127 Lab
- SAMS Grade Book
- Andy's Physics 125 Page
- Qwizdom Overview
- Qwizdom Tutorial
- Links
- Site Info
- Help

James Liu

Physics 125 Winter 2008

Required Elements



Cutnell & Johnson
Physics
7th Edition



University of Michigan Winter 2008

Physics 125 - General Physics I Mechanics, Waves and Sound

This is the home page for Physics 125 – Mechanics, Waves, and Sound – for Winter 2008 at the University of Michigan. This course provides an algebra-based introduction to classical mechanics (laws of motion, force, energy, and power) and mechanical wave motion, including sound waves. Here you will find course information, links to lecture material, solutions, etc.

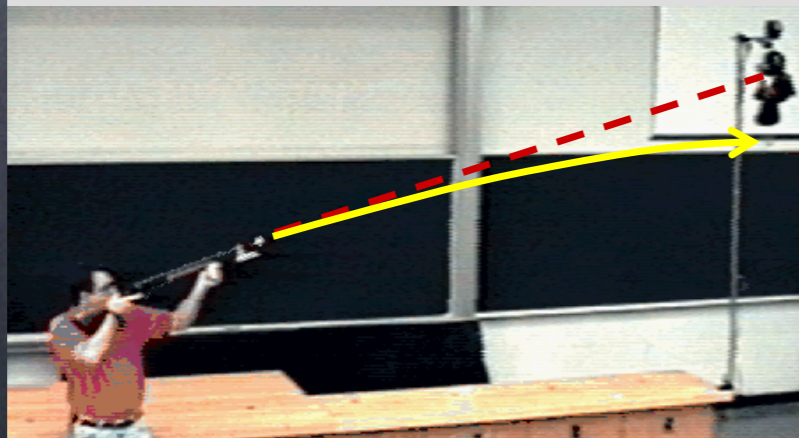
The laboratory course, [Physics 127](#), should be taken concurrently with Physics 125. **Questions concerning Physics 127 should be directed to the course supervisors.**



Integrating demos and clickers

This ninja bear is attempting to escape its doom. It sees me aim the arrow directly at it and pull the trigger, and at that moment lets go of the tree in an effort to avoid my arrow. What happens?

1. The bear escapes, with my arrow passing over its head
2. The bear escapes, with my arrow falling below it
3. The bear, sadly, meets its demise



As the bear falls, the arrow falls as well...

Impact on student achievement

- Twenty years' data for Physics 140

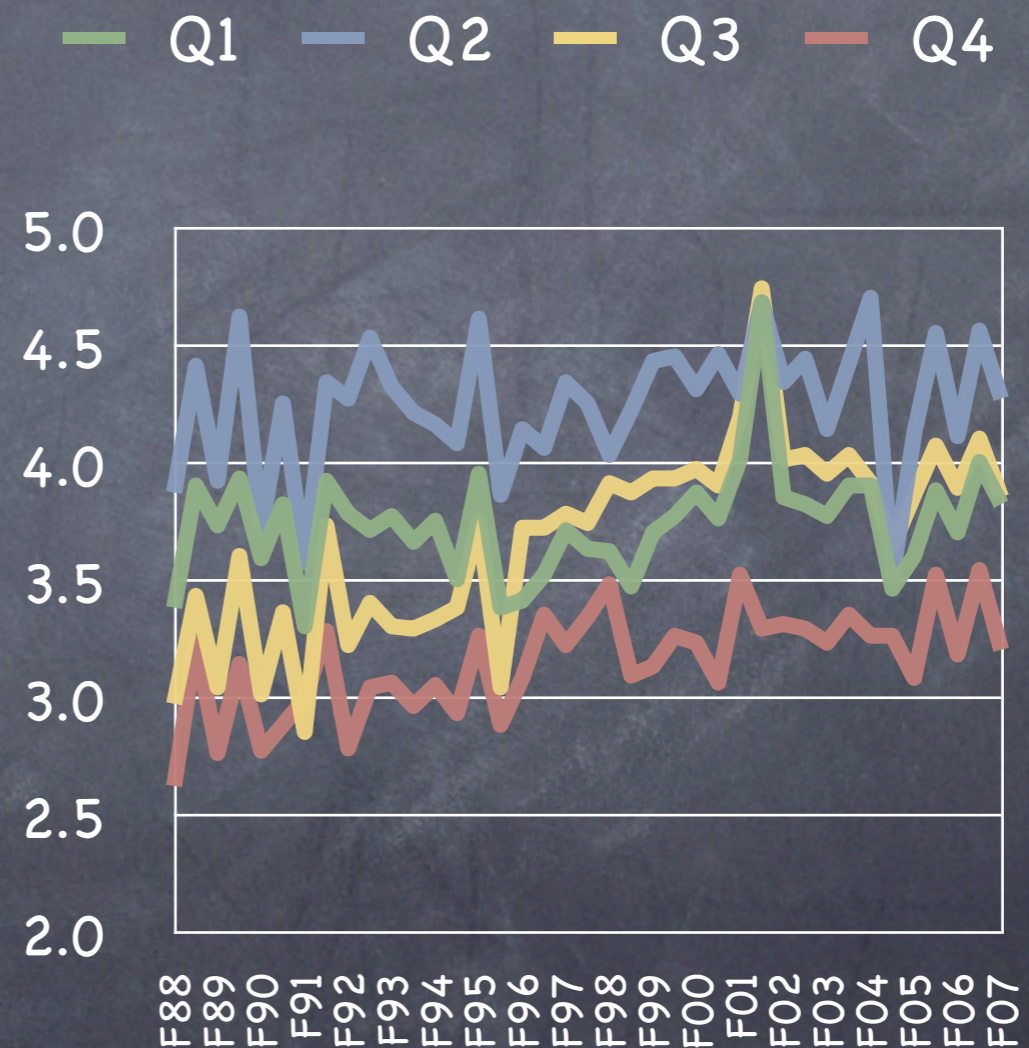
Q1 = excellent course

Q2 = excellent teacher

Q3 = learned a great deal

Q4 = strong desire to take

- Major innovations started around '98



Introductory physics laboratories

- We have undertaken a major revision of both our mechanics and E&M intro labs
- Improved equipment and data taking to allow students to focus on the physics
- Emphasis on in-class mentoring instead of long lab reports
- Use of Excel worksheets for data analysis and written conclusions

Evaluating the laboratory revisions

- Data for Physics 141 mechanics lab

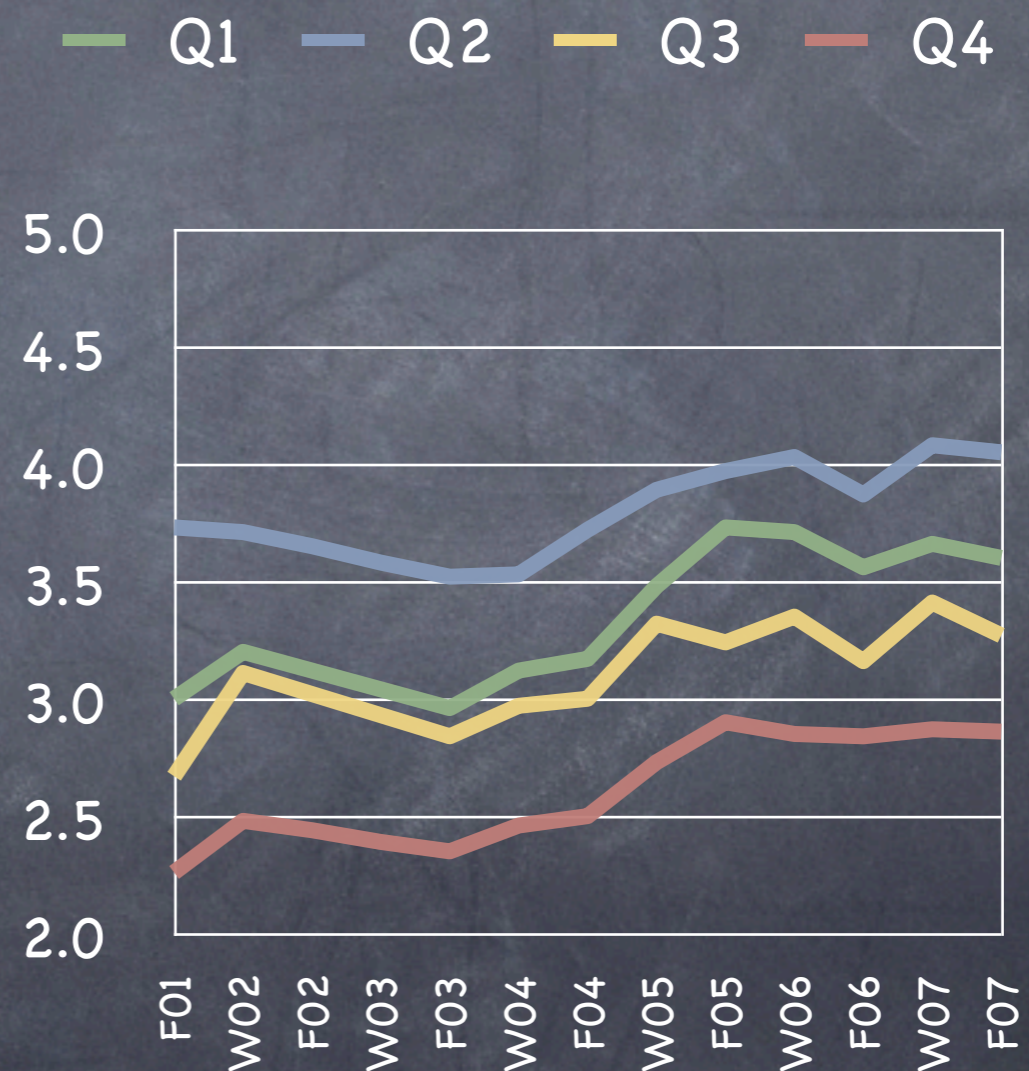
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- Revisions started in Fall 2004
- All indicators have improved



Coming up

David Gerdes

Peer instruction and active learning



Andrew Tomasch

New introductory lab experiments

