Major Structural Change
40+ year tradition

- Deploying faculty differently, no small discussions, use more peer instruction and active learning
- Meet 4 days a week in ~200 student groups
Major issues with curriculum

- Students performing poorly in either 140/135 or 140, or are bored for most of the course. 160 not attracting enough physics majors.
Life Sciences

• New Intro Physics for Life Sciences sequence begun in 2006, an informal part of a larger national IPLS movement
• Complete course redesign to emphasize the physics which enables and constrains life. Calculus is used, though lightly
• Two semesters:
  – Mechanics, thermal and statistical, fluids
  – E&M, waves and imaging, origins (nuclear & cosmo)
• Currently using coursepack of material developed at UM in place of a textbook; textbook in development
• Replacing old ‘algebra-based’ sequence for most students this year
• New labs which emphasize life science applications in development
• If nothing else, changes in AAMC and the MCAT review process should encourage people to think about this.
Honors Physics (160)

- Application of fundamental principles to a wide range of systems i.e. from nuclei to stars
- Integrate some contemporary physics (atomic models of matter, relativistic dynamics)
- Engage students in physical modeling (idealization, approximation, assumptions, estimation)
- Integrate computational physics (now a partner of theory and experiment)
- Given the initial conditions and any set of forces acting on a particle, be able to calculate the trajectory of that particle.
160 Homework problems

• Racquetball court (something that they can relate to, 3D, elastic collisions, coefficient of restitution, leads to discussion of Drude’ model of electron transport.

• Skydiver with parachute (importance of drag, $d \sim t$)

• Random walk of Paramecium (normal distribution $d \sim t^{1/2}$)

• Binary star system and Rutherford Scattering ($\Delta t$ changes by $\sim 10^{25}$)

• Orbit around irregularly shaped object. (volume integration)

• Oscillation (1D wave motion of atoms L-J potential, CO molecular vibration)

• Driven oscillation, resonance (AFM, IR spectroscopy)
Now we have space for a new course

• Design a course to assist the 15% of students who will not pass the introductory class
• The issue is not simple, what do they need?
  – Algebra, trig
  – “Word problem practice”
  – Slower pace
  – Probably no single magic bullet