Introductory Mechanics at Georgia Tech

Two Courses taught at Tech

- A “standard” course based on Knight (TRAD)
- The Matter and Interactions course based on Chabay and Sherwood (M&I)

Demographics

- ~600 students per semester take introductory mechanics
- 83% engineering, 17% science majors
- Large classroom setting (150-250 students)
- Labs/Recitations (15-25 students)

The “Standard” Course (TRAD)

- Covers the usual topics (projectile motion, friction, statics, circular motion, etc.)
- Usual organization of topics (kinematics, dynamics, energy, angular momentum, etc.)
- Emphasis placed on force and motion concepts: constant force motion, kinematic equations, free body diagrams

- Boundary Conditions
  - 3 hour lecture (with “clicker” questions)
  - 2 hour laboratory, 1 hour recitation
  - Online homework system - Mastering Physics

The Matter and Interactions Course (M&I)

- Emphasizes on a principle based approach (Impulse-Momentum Theorem, Energy Principle, Angular Momentum Principle)
- Introduces the ball and spring model of solids and connects microscopic to macroscopic measurements
- Uses modern tools (simulation and visualization)

- Boundary Conditions
  - 3 hour lecture (with “clicker” questions)
  - 2 hour laboratory, 1 hour recitation
  - Online homework system - WebAssign

Results from Standardized Assessment

- Force Concept Inventory (FCI)
  - 20 item multiple-choice test covers force and motion
  - Emphasizes constant force motion and contains strong distractors

- Initial Conditions
  - Essential demographic data not statistically different

- Pedagogy (interactivity, presentation, etc.) very similar

Test Performance

TRAD outperforms M&I

TRAD (%)

M&I (%)

Average FCI Score (%)

TRAD (%)

M&I (%)

Raw Gain (%)