First Version. . .

Undergraduate Education

- *Improving Teaching and Learning*.
- *Engaging Students' Interest in Statistics*.
  - Undergraduate enrollment
  - Undergraduate degrees
- *Extending Pedagogical Approach*.
- *Expanding Appeal of Undergraduate Statistics*.
- *Issues for 2002*.
  - Range and balance
  - Conserving resources
  - Program cohesion

Second Version. . .

Undergraduate Education

- *Improving Teaching and Learning*.
- *Engaging Students' Interest in Statistics*.
- *Undergraduate Enrollment*.
- *SmartLab*.
- *Commitment to Undergraduate Education*.
- *Issues for 2002*.
  - Range and balance
  - Conserving resources
  - Program cohesion

Third Version. . .

Undergraduate Education

- *Improving Teaching and Learning*.
  - Supervised Practice and Collaborative Learning
  - New Courses, New Degrees
  - Undergraduate Enrollment
- *SmartLab*.
  - Description
  - Demonstration
  - Results
- *Issues for 2002*.
  - Content: Range and Balance
  - Delivery: Efficiency and Effectiveness
  - Coherence: Many Roads to Statistics

Final Version. . .

Undergraduate Education

- *Improving Teaching and Learning*.
  - Supervised Practice and Collaborative Learning
  - New Courses, New Degrees
  - Undergraduate Enrollment
- *SmartLab - Computer-Based Cognitive Tutor*.
  - Description
  - Demonstration
  - Results
- *Issues for 2002*.
  - Content: Range and Balance
  - Delivery: Efficiency and Effectiveness
  - Coherence: Many Roads to Statistics

Improving Teaching and Learning

Supervised Practice and Collaborative Learning

- Benefits
  - *Immediate feedback* from instructors, peers, on-line tutor
  - *Active learning* through on-line tutoring, computer labs, data analysis projects
- Prototype courses
  - 36-201/202: Statistical Reasoning / Statistical Methods
  - 36-203: Sampling, Surveys and Society
- Drives revision throughout curriculum
  - 36-217: Engineering/CS Probability & Processes
  - 36-220: Engineering Statistics & QC
  - 36-309: Experimental Design for Behav/Soc Sciences
  - 36-325/326: (Honors) Probability & Math. Statistics
  - 36-401/402: Modern Regression/Advanced Data Analysis

New Courses, New Degrees

- New course development
  - 36-149: The Shape of the River: Race and Diversity in America.
  - 66-149: Words and Numbers: Composing and Analyzing Texts.
  - 36-310: Fundamentals of Statistical Modeling.
  - 36-315: Graphics and Visualization.
  - 36-350: Data Mining.
- New and streamlined degree programs
  - Five different “Majors” in statistics, in two colleges.
  - Reduced math stat requirement in HSS statistics from two semesters (36-225/226) to one (36-310).

Undergraduate Enrollment

- Stabilized or dropped slightly in general education courses (≈ 450/Fall; ≈ 570/Spring).
- Increase in "disciplinary" courses…
  - from 119 (1998) to 204 (2001) in mathematical statistics;
  - from 50 (1998) to 101 (2001) in advanced methods.
- Increase in Degree Recipients…

	Candidates	Recipients		
Degree	2002	2001	2000	1999
HSS Primary Major*	2	2	2	4
HSS Add'l Major*	7	11	5	0
HSS Minor	1	3	2	1
MCS Stat/OR	7	6	6	10
HSS IS Data Mining*	9	– –	– –	– –
Total	26	22	15	15

*New/revised since 1997.

SmartLab - Computer-Based Cognitive Tutor

(Lovett, Greenhouse, Meyer, et al.)

- An *Intelligent Tutoring System* (ITS) based on ACT-R*
- Cognitive Principles of Instruction
  - Make hidden thinking processes visible
  - Build from students' prior knowledge
- Source of power: The details of the cognitive student model
  - Uncover subtleties of student learning
  - Model subtleties in a running computer simulation
- Past successes: LISP, Algebra, Geometry†
- Same principles apply in Statistics‡

*Anderson, J.R. (1993). *Rules of the mind.* Hillsdale NJ: Erlbaum.

†Koedinger, et al. (1997). *Int. J. of Art. Int. in Ed., 8,* 30–48.

‡Lovett & Greenhouse (2000). *American Statistician, 54,* 196–206.

SmartLab Results

- Significant learning gain* in:
  - Classifying problems
    (subject matter $\Longrightarrow$ data structure)
  - Choosing appropriate analysis
- Exploring greater efficiency in TA use.
  - More conceptual interaction
  - Fewer TAs needed (?)
- PEW Foundation: "very impressed...exactly the kind of data we were looking for...."

*Meyer & Lovett (2002). *Implementing a computerized tutor in a statistical reasoning course: getting the big picture.* Accepted, 6th Int'l Conf. on Teaching Statistics, July 2002, Durban, South Africa.

Issues for 2002

- *Content: Range and Balance.*
  - Entry and middle level courses
  - Mathematical content
- *Delivery: Efficiency and Effectiveness.*
  - Manpower for lecture/lab courses, projects courses
  - Maintaining consistency and quality
- *Coherence: Many Roads to Statsitics.*
  - Five degree programs in two colleges
  - Non-"Statistics" degrees (SDS, Comp Finance, etc.)