Draft for Physics Lecture

Tripping across the boundary between science and engineering...

UM Engineering

Rebuilding mode
Basic Parameters
Strategy

Pressures forcing change in engineering

Time-scale of research, development, implementation
Cross-disciplinary nature of important problems
Federal Trends: emphasis on macro, systems
NSF-NSB: ERCs, "big engineering" like "big physics"
Pushing engineering toward private sector?
Pushing engineering away from single-investigator activities
toward cross-disciplinary team research
Bankruptcy of traditional ABET curriculum
Importance of liberal education
Intellectual Questions:
Engineering <=> Applied Science <=> Basic Science
Science -> Engineering -> Systems -> Society
Scientific foundation -> Subsystems -> Systems
Macro vs. Micro

Importance of bonds between physics and engineering

- Intellectual
  - physics is "substrate" of modern engineering
    - Can't have a top engineering program w/o top physics!!!
  - engineers supply new tools for physicists
  - engineers = applied scientists = basic scientists
  - Big physics = engineering systems
- Common needs of sciences
  - Generic concerns
  - Faculty
  - Facilities
  - Support Staff
  - Importance of sponsored research
- Economic
  - Common facilities
  - Common faculty
  - Reinforce each other in going after State and federal resources
  - Reinforce each others efforts in going after University resouces

Strategy for Strengthening the Bonds

- Recruiting strategies
- Major investments: "quantum engineering institute": CAEOT
- Strengthening the Bonds: Engineering <=> LS&A
  - Applied Physics
  - Applied Mathematics

- Biotechnology, Bioengineering
- Information Sciences
- Earth and Planetary Sciences
- Computational Science and Engineering

College of Engineering and Applied Science???

Importance of science & engineering to University

Other models: Stanford, Princeton, Illinois, Minnesota

Science is where most of new knowledge is...

- History, social sciences just rearrange, codify knowledge
- Scientists discover new knowledge; engineers apply it!
- "Physics is research; everything else is needle-point"

General Concerns

- Science have not be a priority at UM
  - Physical sciences have not been adequately rep among UM admin
  - While UM has emphasized soc & med sciences, we've been passed
    - Critical momentum is needed to sustain
      - One you've achieved this, self-supporting
      - Stanford, MIT, Caltech, CMU, Berkeley
      - Illinois, Minnesota (note both tied to engineering...)
- Sciences immersed in LS&A mentality
  - (cannot expect hum-soc sci model will build strong sciences)
  - Particularly critical on equipment & support staff
  - Importance of sponsored research not recognized

A millstone around your neck!!!

UM has been dominated by "observational" approach of the social sciences

to merely watch and analyze and reflect. Those institutions

moving most rapidly, doing new things, are led by the sciences...

by people used to discovering new knowledge and applying it...

of actually creating something new!

Political

Trends at UM: social sciences -> health sciences -> sciences

Eng & Science must work together to reestablish priority at UM

Together we can win this; divided we both go down