Future trends in engineering

Education:

Engineering fundamentals in undergraduate level, translating into a need for Engineering technologists.

Broader education and enhanced specialization capabilities

Producing engineering managers instead of engineers

Changes in ABET require redefined philosophy, administrative and integrative tasks

Research experience for undergraduates

Team development critical

Fundamental skills: predict behavior of a component/system with mathematical equation

Acquire new knowledge with experiments

Design a component or a system to meet a need

More students working part time while studying, which reduces the time they have available to study

Nanotechnology in education

Graduate co-op

More international students at the undergraduate level

Reduce foreign student enrollment at the graduate level

IIT students will no longer come to UC

Continuing education and distance learning

More education of existing engineers

Need to keep up and change every few years

Education and reeducation of aging global demographics

Several specialty fields have an aging workforce: nuclear, aerospace

Strong competition from other educational institutions as students will likely sign up to online web-based courses from other institutions

Distance learning will become more practical

Distance learning/training –add courses

Focused training such as corporate education units will replace the current depth /breadth (e.g., GE's advanced course in engineering) Europe Is moving this way at the UG level. Many Ohio undergraduate engineering programs may cease to exist.

Biotechnology, Bioengineering

Medical technology—quality of life, extending life

Increased applications in Bio area—the engineering aspects of health care issues

Biological analogies as models for technology

Biosensor—monitoring & responding

Biomems

Biotechnology becomes more important

Natural sciences are even more important aspects of technological change

Nanotechnology

Smaller feature sizes, exploiting miniaturization

Hand held devices of decreasing size

Portable computing

Smaller more powerful

Greater automation in both manufacturing and service sectors including engineering systems will become smarter and smaller in scale

Nanotechnology, Bio and IT will become interconnected

Real emergence of nanodevices

Molecular engineering

Nanotechnology-materials

Nano and microtechnology and the interface between

Information Technology

Information technology

Information technology related to learning education tools

IT in learning/education

Information technology and software development, hardware, and human interface

Web-based, data-based

Resources need to be more available to help faculty retool and keep up with technology, (e.g., use of laptop, Blackboard)

Giving technology a simpler interface

Grid computing and possibility of performing simulations not previously possible

Shift towards simulation and away from experimentation

Too much information - informatics

IT—specifically transform and accessibility; tracking, materials, ports

Pervasive computing and networking

Export of engineering jobs

Shift of manufacturing overseas now happening within engineering.

Jobs going overseas; problems for US leadership (Is targeting MS/PhD an answer or does it provoke more problems?)

Jobs to India and China – more on line web-based competition

Exodus of jobs to Asia and Eastern Europe

Outsourcing work to India; Chinese/Indian students are better in basic math & sciences

Decline in manufacturing facilities—moving overseas

Engineering outsourcing—to other countries; engineering needs to go to more complicated areas like design

Reverse brain drain –foreign graduates will return home

Homeland Security

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Homeland security issues; remote observation and reconnaissance

Environment

Hydrogen economy, the environment

Environmentally friendly

Energy for global environment; alternative sources

Transportation/energy

Green engineering, green chemistry, clean water supply management

Multidisciplinary

Awareness of multidisciplinary nature of engineering

Multidisciplinary

More integration and work teams including a virtual work environment

Communication, team work

Distributed interdisciplinary collaboration (cross departmental) (capitalizing on the synergy among departments)

Other

Computer becomes an enabling tool, a device that will accelerate innovation

Value added engineering

Complete 360 degree aspects of design, not just technical, but societal and environmental

Pay more attention to the regulatory and legal aspects of technology

Ethical implications

Infusion into every day life

Work, personal life becomes more tightly coupled; no distinction

Technology, communication from birth

Quantum computation