

Morning breakouts. Question 6

General Grand Challenges

Not about ownership but taking leadership to include interdisciplinary teams; technical and nontechnical, such as social, policy.

Sustainability leadership

We can just keep adding courses. What do we take away; what do we reorganize.

Some disciplines have in their names topics like environmental engineering or bioengineering. But ME those not and these grand challenges not associated with ME.

Purdue students responded to grand challenges in ME290 located @globalhub
How do students see the grand challenge?

Appropriate technology to improve quality of life in helping humanity and sustainability and make a difference

Capstone design courses can implement appropriate technology

What about faculty research?

Survival of MEs requires that we do this to get diverse and numbers of students.

Energy

Energy has a clear connection to ME, but it may not be apparent from our curricula and projects. There were some cases where MEs were not in the leadership role for campus energy initiatives. This is partially because of emphasis on biofuels.

Renewable energy, wind, solar, geothermal, ocean

Generation, transmission and utilization. Should articulate role of ME in each part.

How to utilize pathways, tracks minors with emphasis on grand challenges?

Climate

Green manufacturing, life cycle issues

Energy efficiency – either in production or use, alternate energy

Work on reduction of green house gases, including human waste

Challenges need the fundamentals core topics in ME – fluids, thermo, heat transfer, etc.

Every course should address the impact of these grant challenges in different ways in all courses.

Global warming offers opportunities for cold water navigation

Impact of mechanical and product design?

Full life cycle analysis cradle to grave

Cradle to cradle – challenge

We should emphasize ambiguity, how to handle uncertainty.

In curriculum, awareness, titles of ME courses do not reflect these issues

Facilitate pathways thru curriculum that focuses on grad challenge

Fresh Water

Ocean energy with desalination

Build environment involves ME and water, energy

Water involves fluid flow, simulations

5,000 children/ day die because they can't get access to water.

MEs play a role in pumping, purification, and transportation of water in a sustainable way.

Quality of Life

Quality of life includes health, well-being, H₂O, economics, functioning, and sustainability.

Collect good exams that can be used to illustrate these projects by students, web sites, YouTube, political process. Set research agenda.

We should not be shy of getting involved in social-political arenas.

Our curricula need to benefit the practice of engineering

Equivalent of I am an IBMer for MEs.

Awareness of problems for students thru curriculum

Instill in engineering students to aspire to broad issues.

Maybe ABET can work for us – contemporary issues and societal impact

Students need to be able to work on multidisciplinary teams.

Design, develop, build, and manufacture devices to help improve the quality of life, bionics, cognitive connection, and microsurgery

Marketing of ME as it relates to quality of life.

Collaboration with medical schools, hospitals

Project for disabled

Project based learning, extra curricular

Curriculum – we are still locked into the 19th and 20th century

Doing piecemeal in most departments - need to coordinate but make it real in curriculum

Me by name does not imply QOL solutions.

Develop case studies around quality of life issues

Bring project-based examples in every course

Connect every course to quality of life issues at all levels

Encourage policy issues in course

Videos or examples of engineers in practice working on exciting area of grant challenges.

Health and Well Being

ME do work in diagnostics, x-ray, and radiation.

ME should collaborate with medical doctors, hospitals

Make biology a component in ME curriculum

Include ore flexibility in curriculum

Applications oriented electives

Concentrations, minors, etc.

Collaboration with anything bio, such as biomedical, biology and public health
Applies to the world and thus brings in appropriate technology

Prevention of Poverty

Entrepreneurship and innovation

Humanitarian engineering thru projects, such as human-centered design.
Certificates or minor

Appropriate technology to needed communities

Energy and renewable energy in poverty=stricken areas

Human-centered design includes sustainability

Include global poverty discussion in humanities – social sciences to draw on these courses and include faculty. Maybe co hire faculty

Draw on study abroad

Engage critical analysis in Humanities – SS

Influence in hiring faculty from H-SS and policy

Prevention of poverty solutions should include raising the level of education, even if at the manufacturing so that they can improve their own quality of life. Micro financing, entrepreneurship

Global economy

Why do companies hire MEs – to make money?

MEs need to understand business models

CEOs of fortune 500 companies are 6 times more likely to have engineering degrees

Ambiguity and problem solving ME calculations, finance

Leverage broad foundation that ME education provides

Breadth of ME is opportunity to appeal women and diverse people

And is the profession best addressing the grand challenges. What is the reality of what we are actually doing?

Culture Change

If we grand challenges are important how do we address with faculty

Develop small case studies to address GC

How do we get funding agencies to fund GC – We are part of the problem.

Speed of change is important as other disciplines may take over. Environmental engineering example in energy

Issue – how we define our curriculum is not explicitly aligned with GC

Capstone design for developing countries

Working with Engineers W/ borders, ESW

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