

Session 2 – Industrial Advice Summary Report

Frontiers in Chemical Engineering Education

Workshop on Industrial Vision and Needs
Summary of Day 1 Industrial Breakout Sessions
Atlanta - June 2005

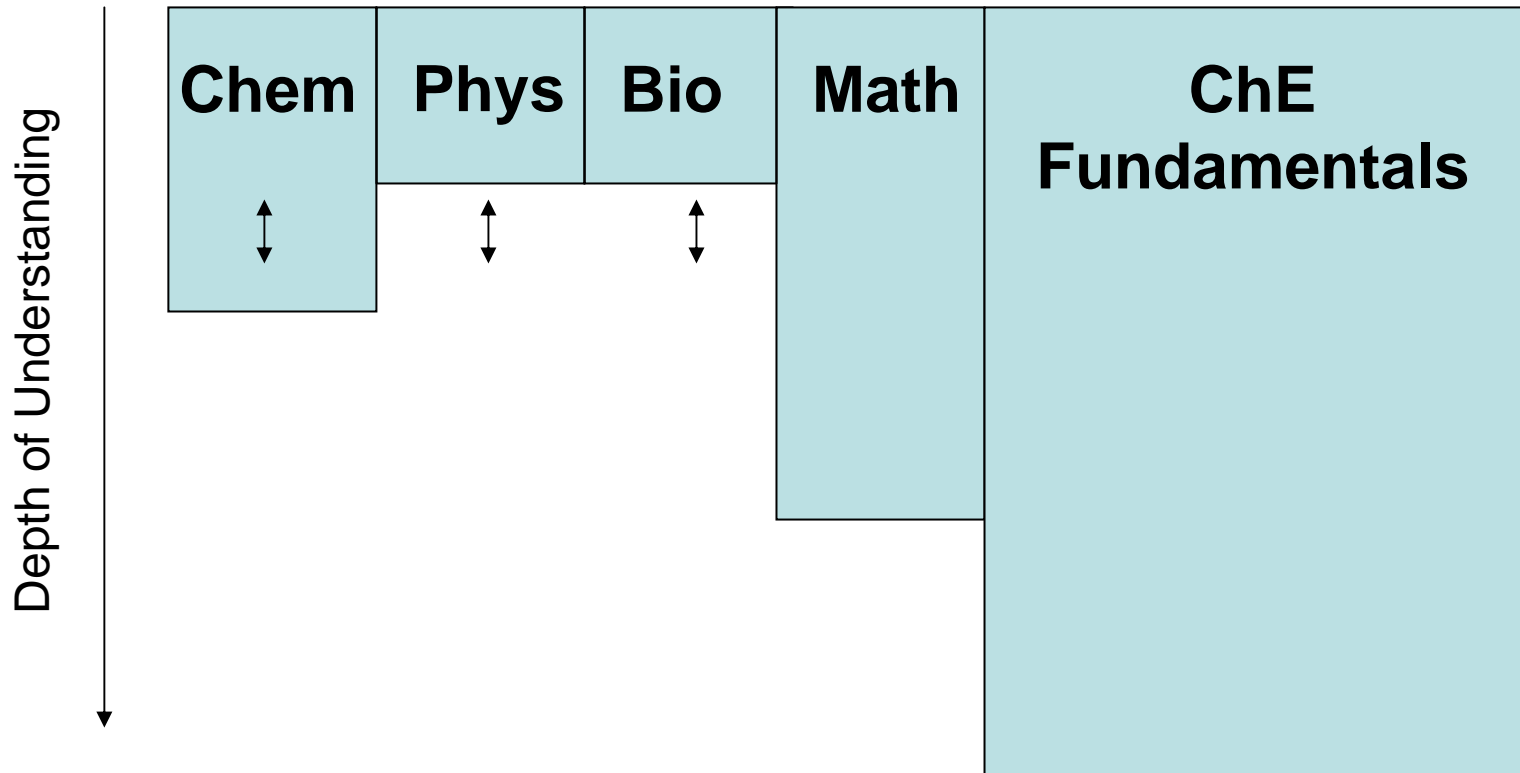
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Outline

- Attributes of a Marketable Engineer
- Why change?
- Curriculum content

BSCHE Knowledge Req'd



The Technical Ante for Getting Into the Game

Attributes of a Marketable Engineer

- Technically sound
- Analytical and critical thinking
- Motivated and independent with ability to work well in teams
- Effective communication skills – written and oral
- Effective interpersonal skills (“works and plays well with others”)
- Professional and Credible (“kids these days”)
- Open-minded

Why Change?

- Need marketable, world class engineers for global economy
- Current state is pretty good – some areas need work
 - Not opposed to different content organization for improvement
- Focus on integrated approach (across ChemE and across disciplines)
- Endorse concept of “spiral education” – could be powerful improvement in understanding level

Change to improve, not for sake of change

Questions and Concerns

- What are performance metrics for success of curriculum change?
 - 1st year vs. career path
 - Salary
 - Employment rate
 - Enrollment
 - Attraction of best and brightest undergraduate students
 - Industry – pool of highly desirable candidates
- Will curriculum change better deliver a “marketable engineer” ?
- Cannot be complacent (arrogant?) about US “superiority”

Strengths of Current Curriculum

- Classical Chemical Engineering Foundations – underlying phenomena - have not (will not) go out of style
 - Applications may change drastically (unpredictably?)
- Problem framing, approach, and solving
- Conversant in and with the basic sciences
 - With possible exception of biology
- Exposed to processes at multi-scales
- Mass and Energy Balances – a key to understanding all relevant phenomena
- Understanding of Processes is key differentiator for Chemical Engineers over all other disciplines

Opportunities for Improvement

- Dealing with uncertainty (probability, statistics, risk analysis, decision analysis, design of experiments)
- Industrial experience is highly valued by industry
- Cross functional/locational/experiential/cultural teamwork and leadership
- Effective communication skills – oral and written
- Understanding of the “Value Proposition”
 - Product, process and commercialization
 - Basic financial analysis (NPV, EV, ROI)
- Lifecycle analysis
- Process Dynamics and Control is important
 - Could/should be taught differently

Awareness Topics for ChEs

- Recognizing the “zero sum game” of the curriculum - development topics to touch on (not deep review)
 - Breadth of chemical engineering applications
 - Impact chemical engineers can have on society
 - Ethics
 - Professionalism
 - IP
 - Global diversity
 - Stage gate development processes
 - Giving/receiving **constructive** criticism
- Mentoring can complement the structured curriculum

Final Thoughts

- A lot can be done within current framework
- ChemE curriculum must prepare students for research and industrial applications
 - Need to supply US with ChemE's throughout value chain
- Proposed curriculum is an innovative approach to teaching ChemE – needs to continue to incorporate the fundamentals

“Don't throw out the baby with the bath water”

Thank You for the Chance to
Participate