

Vision 2030

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2. What are the missing components in the traditional Mechanical Engineering curriculum will help prepare students for 2030?

Group #2:

Students do not have a background in business sector, i.e., accounting, project operations management and cost accounting, global business operations, and need to make a profit.

Teamwork, knowledge of other cultures, softskills, and global perspectives are what industry wants, not free-body diagrams.

Understanding of mechanisms on molecular level, e.g., statistical thermo, life sciences (cellular level)

Appreciation for the behavior of different systems at different scales.

Do we have the right mix of faculty members to lead the efforts for doing soft skills and new topics like multiscale.

Should are new doctoral students being trained to have more soft skills.

Does the current university environment facilitate change or is the current structure inhibiting.

Diversity of faculty, tenure/tenure-track, professional faculty, clinical faculty, professor of practice so that some faculty groups can introduce new things and the other groups would see the new things and would then integrate the new things in program. Have more faculty in professional practice.

Is inertia an obstacle?

Group #1:

Integration of courses, i.e., using a system view and seeing the big picture. Don't do at the end of the program in capstone design but earlier. Across disciplines is an issue.

Not enough room for the soft skills, e.g., communications, ethical issues, marketing, teamwork, cultural, teams, professionalism. Even though ABET says we need to obtain these, we need to do a better job. We need to integrate the soft skills in the traditional courses. Need to work

with the general education faculty so they emphasize how important these skills are. Connect these dots across disciplines/boundaries.

We need to have more hands-on opportunities, practice based learning, demonstrations of concepts.

Labs comes a little late and we should be integrating labs with courses.

There are not as many required courses in curriculum, e.g., thermo I and II, due to reducing in credit hours and push for more general education courses.

Students being able to learn on their own. Life-long learning skills.

Biology in the program?

Life science is a potential area with technological focus.

Summary: Don't just add on, integrate.

Group #6:

Systems view functionality of large multi-component systems. Students appreciate non-technical and non-mechanical views.

Bringing low costs solutions that will impact the masses. Sustainable technologies.

Problem formulation vs problem solvers.

World citizens among engineers, minimal/appropriate design.

Missing components: cross-cultural design. Practical hands on skills and the processes you use. Emerging technologies virtual reality, virtual manufacturing, virtual prototyping, life cycle analysis,

Implicit curriculum.

Need to have the fundamentals and provide opps for depth in one or two areas. There can be minors were other opportunitites.

Breadth vs. depth. Articulating career paths.

Make sure you use modern engineering tools.

Group #5:

Have students become aware of people skills and leadership since they work on projects and teams. Still seek creative ways to implement.

Innovation and entrepreneurship. Big change in student interests. Technical development makes a product/new business marketing. Entrepreneurship is the implementation of innovation (actually does not have to be). Innovation is foster new ideas, creativity. Foster critical thinking, failure as part of learning. Team work can foster innovation.

Have general education address more of the above skills. Need to have a better bridge between general education faculty and engineering faculty.

General education does not have a technological component. Need to have this both ways for engineers and non-engineers. Engineering faculty need to be more involved so that the general education requirement has technological component.

What is technically missing?: Introduction to fields of opportunity. How expectations will be answered in the curriculum.

Group #4:

MEs do not emphasize that we serve people in different ways, e.g., health care, environment, etc.

How to get biology into the curriculum, required course, optional course.

Flexibility in curriculum. Give students the option of tracks in management, leadership, marking, mechanical, thermal system, etc.

Exposure to business topics. Decision making.

Culture of understanding that prerequisites are important, i.e., responsible learning, ownership of knowledge. Culture of just-in-time learning, when students need to know something they need to find out.

Teach more interdisciplinary aspects in curriculum. Interactions of mechanical, electrical, and computer science.

Fundamentals vs. confidence.

What is the minimal content that is needed in the curriculum.

When is an ME not an ME?

Promotion of practice experiences.

Group #3:

Breadth is missing in the ME curriculum. Many do not focus on interdisciplinary issues, electronics, bio, nano, etc.

System engineering viewpoint. Modern systems, large and small and both.

Flexibility to allow adaptively in curriculum.

Better value from general education, i.e., communication skills, global, scales, technical writing skills, etc. They address the outcomes we cannot address that may include soft and hard skills.

Provide students with an awareness and appreciation of engineering in a global context.

Integration within the curriculum that is vertical and horizontal. Is there a spine?

Textbooks are made for a traditional curriculum. Need text modules to integrate innovative material into the traditional courses.