

1st Annual Meeting of the National Engineering Mathematics Consortium - June 2009

“THE BRAVE NEW WORLD OF ENGINEERINGAKA THE KLINGBEIL MODEL”

Major Milestones

- I. All UTEP departments in the College of Engineering have agreed to undertake a common introduction to engineering that is going to serve as the primary gateway into engineering courses at UTEP.
- II. The Basic Engineering program at UTEP has been adapted and reconfigured to support the changes. Civil, Mechanical and Industrial Engineering departments have submitted new degree plans, that have been approved by the College of Engineering curriculum committee and have also passed the UTEP Faculty Senate.
- III. All the engineering departments, namely Civil Engineering, Computer Science (CS), Electrical & Computer Engineering, Mechanical Engineering, Industrial Engineering and Metallurgical & Materials Engineering, are adopting a new common core class.
- IV. CS has a grant-driven pioneering model in place --- the so-called Freudenthal Model. We will parallel the teaching of the two courses, and using the two models we will develop best practices.
- V. The new core course for engineering students is UNIV 1301 “Foundations of Engineering.”
- VI. The course is taught within the core curriculum, as the UTEP institutional component.

PLAY THE GAME: WHERE IS NATHAN?

Consultative Development of Course

The conglomerated results:

1. **Engineering Student Practice (ESP)** Components – study, communication, research, time management and study skills; personal development; university life/activities/resources; research methods/techniques (commonly called the “soft skills”).
2. **Engineering Concepts** – engineering design, critical thinking, engineering disciplines, scientific method, project management.
3. **Engineering Mathematic Applications** – units systems and conversions; linear, quadratic and systems of equations, Pre-calculus, basic differentiation/integration, probability, trigonometry, matrices.
4. **Engineering Professions** – mentoring, engineering economics, applications-centered, technology and public policy.

Course Load Balancing - the Place of Engineering Applications of Mathematics

The final question of the survey (for directors, faculty and staff) asked for a load balance of these four content areas for the retooled UNIV course. In general, the loads recommended are:

- **Engineering Student Practice - 20%**
- **Engineering Concepts - 30%**
- **Engineering Mathematics Applications - 30%**
- **Engineering Professions - 20%**

Or, in other words, there is agreement in the College of Engineering at UTEP that the **technical tools (in mathematics and engineering) make up 60% of the course content** and the success skills in engineering education practice and profession should make up 40% of the course content.

Within the content areas, there is agreement between students and faculty/staff that the priority engineering concepts of focus are critical thinking, the scientific method, and engineering design.

The top mathematic applications are: unit systems/conversions and linear/quadratic equations, matrices, trigonometry and vector calculus.

Finally, for the professional aspects overwhelmingly the access to mentors or representatives of the industry are seen to be the key focus elements.

Project Emphases in Year 2

- Implementation and testing of the fundamentals course will proceed at UTEP.
- Our College of Engineering has 10 sections of the new course scheduled for teaching in Fall 2009.
- The advising of students through our College of Engineering entering students program --- CircLES of Learning for Entering Students (CircLES) is being adapted to provide support for students undertaking the course.

- Orientation of engineering students is being revised to enhance awareness of the course and the role it plays in introducing students to engineering courses and programs.
- The fundamentals of engineering course is to be institutionalized in Year 2.
- Investigate parallel and subsequent UTEP engineering math applications course paradigms.
- We will continuously evaluate and measure the impact of changing curriculum on student progress in engineering.

College of Engineering - The University of Texas at El Paso