

## **118a Pillars of Chemical Engineering: an Integrated Curriculum**

*Joseph J. McCarthy, Adetola A. Abatan, Robert S. Parker, and Mary Besterfield-Sacre*

The challenge of developing a better Chemical Engineering Curriculum, or any Engineering curriculum, is to build it such that it prepares students for the engineering economy of today, while enabling them to maintain versatility through life-long learning and continuing education. Toward this end, the National Science Foundation (NSF) funded a number of Coalitions to study “best practices” in Engineering Education. Overwhelmingly, these Coalitions have favored active-learning activities and integration of complementary subjects.

With funding from the NSF, we have expanded the recommendations of the Coalitions and developed an integrated Chemical Engineering curriculum that spans the Sophomore to Senior years. To implement the integrated curriculum, we are using block scheduling, a technique with a strong literature base in K-12 education. In a nutshell, through block scheduling multi-semester courses are delivered in a single-semester course.

The result has been the Six Pillars of Chemical Engineering. These courses have considerably longer contact hours than a traditional University course so that: (1) students may gain systems insight through integration of their core knowledge across traditional course and discipline boundaries; (2) the instructors have the time to include truly multi-scale (from molecular to continuum to macroscopic) descriptions of Chemical Engineering content; and (3) the instructors have the flexibility to accommodate diverse learning styles and incorporate active learning more effectively.

In this paper, we outline the design of our Six Pillars and highlight preliminary results from the pilot of one Pillar: Transport Phenomena. By using a suite of assessment techniques including concept maps, concept inventories, and surveys, we hope to produce a truly validated success story that can serve as a model that is applicable for all engineering disciplines.