

Vol. 3, Issue 6  
June 2003



<http://www.foundationcoalition.org/>

### **From Jeff Froyd, Project Director**

The seven key ideas on which Foundation Coalition (FC) partner institutions based their curricular renewal projects continue to provide the foundation for many current curricular renewal efforts:

- Active/Cooperative Learning
- Recruitment, Retention, and Graduation of Women and Underrepresented Minorities
- Technology-enabled Learning
- Curriculum Integration and Learning Communities
- Student Teams in Engineering
- Assessment and Evaluation
- Curricular Change, Resistance, and Leadership

I think that FC had made and will continue to make valuable contributions to conversations about each of these key ideas. One-page introductions and minidocuments on topics related to these key ideas can be found at <http://www.foundationcoalition.org/publications/brochures/index.html>.

For student teams, FC faculty members have constructed and recently published two documents. The first, Team Process Check, ([http://www.foundationcoalition.org/publications/brochures/team\\_process\\_check.pdf](http://www.foundationcoalition.org/publications/brochures/team_process_check.pdf)), describes an assessment instrument with which faculty members might collect data on how well individual teams think that they are performing against a set of capabilities required for outstanding team performance. The one-page introduction also describes how faculty members at three FC partners have used the collected data to evaluate instruction in teamwork. Faculty members often express the need for resources that they might use to provide team training for their students. The minidocument, Effective Decision Making in Teams ([http://www.foundationcoalition.org/publications/brochures/effective\\_decision\\_making.pdf](http://www.foundationcoalition.org/publications/brochures/effective_decision_making.pdf)), provides content, activities, and resources that faculty members might use to help their student teams improve their capabilities to make decisions as a team.

In technology-enabled learning, FC faculty members have developed a one-page introduction to Electronic Response Systems (ERS). It is available at <http://www.foundationcoalition.org/publications/brochures/ers.pdf>. It describes what ERS are and how they might be deployed in a classroom to improve interaction, assessment, and learning.

For curricular change resistance, FC faculty members published a paper at the 2003 ASEE Conference on the evolving models of curricular change across the Foundation Coalition ([http://www.foundationcoalition.org/publications/journalpapers/asee2003/curricular\\_change.pdf](http://www.foundationcoalition.org/publications/journalpapers/asee2003/curricular_change.pdf)). It provides some insight into how thinking about curricular change has been altered through the experiences of developing and implementing pilot curricular as well as the challenges of building on the pilot curricular to construct new curricula for all engineering majors. The same team has submitted a journal article and is preparing additional articles and documents.

Upcoming Event  
Upcoming Event

**Nov 5–8**  
**Frontiers in Education Conference**  
**Boulder CO**

# On-line Electrical Engineering Modules: The Design Studio



**Jo Howze**  
Associate Dean of Engineering



**Prasad Enjeti**  
Electrical Engineering Professor



**Graham Booker**  
Electrical Engineering  
Graduate Student

Faculty members at Texas A&M University have constructed a new approach, which they call “Design Studio,” to recitation sections of their sophomore circuits course, ELEN 214. Formerly, recitations were problem-workout sessions; now recitations expose students to design principles. Faculty members present students with problems that often have conflicting criteria that need to be balanced and have multiple solutions. These modules were created under the direction of Jo Howze, Prasad Enjeti, and Graham Booker. Design studio problems for the circuits course can be accessed at <http://www.foundationcoalition.org/resources/ee/index.html>.

The design studio approach not only shows students that there is more to electrical engineering than analyzing circuits, it also provides a venue for exposing them to various fields that they might like to study. Problems are stated in words, sometimes with no circuit diagram. After using design studio, students asked many more questions in class.

***“On occasion, students have presented me with a solution that is more novel, cheaper, or more functional than my own. They learned more through this design studio than they did through problem-workout sessions. They were challenged with problems that required thought and careful consideration. The modules were designed to show the students that the real heart of engineering is solving problems with no single solution.”—Graham Booker***

***“Traditionally, engineering has been taught with a ‘from the bottom up’ approach. Engineering is actually from the top down. You go from the need and carry it to the next level. ...As research became more important for universities, we got out of balance. The goal is to get students excited about engineering—the goal is retention.”—Jo Howze***

***“We wanted to get more done, and we wanted the students to be challenged.”—Prasad Enjeti***

***“The professors have all responded well and want to continue to use the design studio. The students’ evaluation of it was 70% positive!”—Rebecca Morrison (Teaching Assistant)***

The driver for the design studio concept is several open-ended, top-down electrical engineering circuits problems that have numerous solutions and often either have missing information or too much information. Additional real-world constraints (such as efficiency, size, weight, power requirements, cost, and manufacturability) were introduced, as appropriate. Students were asked to consider tradeoffs among various constraints in generating alternative solutions and selecting an desirable solution. Students were divided into groups; each group received a specific problem assignment each week. A teaching assistant explained the problem and supervised the design process involved, along with the constraints. The design studio link details each design problem.

Discussion and details about the design studio, as well as contact information for the principal people involved in its creation, may be accessed at <http://www.foundationcoalition.org/resources/ee/designstudio/contacts.html>.