

Title of Paper: Engineering in Context: A Multi-Disciplinary Team Capstone Design Experience Incorporating Real World Constraints

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Abstract:

The School of Engineering and Applied Science (SEAS) at the University of Virginia (UVA), in the Spring 2003 semester, introduced a new three course sequence to provide engineering students with a multi-disciplined team capstone design experience. This initiative addresses the concern that engineering graduates are frequently ill-equipped for the interdisciplinary, collaborative and cost-driven environment of the professional engineer.

The three course sequence was specifically developed to address industry's expressed needs, as delineated in the Engineering Criteria 2000 Criterion 4 requirement that students must be prepared for engineering practice through ... a major design experience. . .incorporating engineering standards and realistic constraints that include most of the following considerations; economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.” The sequence also contributes to the achievement of the Criterion 3 outcomes.

The paper describes the evolution of the design course sequence from concept through development, implementation, and assessment. The paper highlights the distinctive features of the initiative, specifically, the importance of early and accurate *problem definition* and emphasis on *students taking initiative and responsibility* for defining and managing their projects. The paper also presents the conceptual model underlying the initiative, which defines the context of engineering as having three distinct but interrelated elements: technical, organizational, and cultural.

The driving forces for change are reviewed as are the importance and impact of real world contextual issues acting upon today's contemporary professional engineer. Specifically, the paper describes how the three course sequence supports the new overarching SEAS Engineering in Context (EIC) initiative, the objective of which is to integrate realistic, multi-disciplinary, team-based engineering design challenges and case studies into the entire four year undergraduate engineering program.