A New Paradigm for the First Two Years of General Education:  
The Integrated Curriculum for A Science or Engineering Program of Study 

The Engineering Component

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The Aerospace Engineering Perspective

The ICE program was introduced at ERAU in the freshman year though the combined efforts of a diverse, inter-departmental faculty team. From the Aerospace Engineering prospective this activity supported a desire and a need to improve the freshman student experience, to address attrition and to improve overall student academic performance. Earlier efforts in 1994 initiated to reduce attrition in the freshmen year of the Aerospace Engineering (AE) program were directed at refining a student success oriented course along with a comprehensive effort to assist entering students adjust to college life.

Previously, starting in the early 1980s, all AE freshmen took a two credit Introduction to Aerospace Engineering course, AE101, in which they worked in teams to engineer a simple yet technically correct design of first a rocket and then of an airplane. Instructions describing the nature of the design process, presenting procedures and necessary equations while also providing needed design data, were given as handouts for each. These projects were accompanied by a traditionally delivered broad-brush treatment of related theories, some curriculum and career discussions, a few videos and a field trip or two. The course was intended to assist the student in affirming their career choice and, for that purpose, was well received. However it yielded only marginal aid in addressing looming attrition statistics which often approached 50% in the first semester. Similarly it was uncertain as to what affect it had on overall student academic performance in subsequent courses although intuitively the AE faculty believed it to be positive.

New elements were integrated into and around AE101 during the 1994 academic year that addressed time management, study habits, note taking and test taking and also the out-of-the-classroom quality of student life. In AE101 the association of the physical science, mathematics and communications were emphasized throughout the projects. Teams were still expected to produce a simple design in response to a stated mission, and also develop a short summary report and deliver a brief presentation of their designs. Initiatives that addressed the other aspects of student life included arranging collective common housing exclusively for engineering students, the implementation of an intrusive peer mentoring system, making available Supplemental Instruction for Math and Science and involving students in social activities with upperclassmen, organizations and faculty. Retention/attrition data for 1992 had been reduce from mid '80s 45%+ downward to 30% and by 1996, with the new initiatives in place, had reduce even further to 24% with nearly all other factors remained constant during that period. While these activities did indeed improve retention there remained a lack of connectivity in the curriculum and student academic performance in advanced classes had not appreciably improved. Also, without formal instruction or training, students working in teams were often confronted by conflicts that they were ill equipped to resolve.

ICE has significantly broadened the scope of the teamwork component in the freshman program. It has provided the faculty with formal training in collaborative learning/teaching environments, and has successfully integrated topics in math, physics, communications and engineering. The AE101 student projects base has been expanded and designed to blend with the topics used in Physics and Calculus. Further, it fortifies the communications component of the freshman year in a meaningful way for the students. Best of all student academic performance, when compared with a control group of traditional students of similar academic capability, has increased upwards of 20% in grades and success rate. ICE works!