Initial Impact of a First-Year Design-Build-Test-Compete Engineering Course

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Course Profile
Five offerings of a first-year course, “Engineering 100: Introduction to Engineering, Blimp Section”
• Incorporated extensive and experiential Design-Build-Test-Compete pedagogy
• Emphasis on Aerospace Engineering
• Excellent teaching evaluations, but expensive in instructor commitment and resources
Course features
• Sequence of two Design-Build-Test-Compete projects (balloon and radio controlled blimp)
• Coupled technical and communications (foundational labs, reports, oral presentations)
• Dedicated lab, ~$100/student in lab disposables

Student Entry Profile
Fig. 1: Entry Profile of Col. of Eng. Students: 2000–08
• Opacity reflects number of students
• 10,000 students total

Comparison metrics include
• Entry scores (high school GPA; ACT/SAT scores)
• Preparation (math level)
• Advanced preparation (AP and transfer credit)
• Extracurricular activities (sports, music, other)
• Subsequent grades

Fig. 2: Performance of Fall Eng 100 Students: 2004–08
• Student performance generally improved by participation in the Design-Build-Test-Compete blimp course in both
• Following winter term GPA
• Later term entry Aerospace Engineering course (Aerospace Engineering 245)
• Insufficient data
  - at higher levels of entry credit
  - to determine most valuable type of transfer credit (e.g., technical or non-technical)
• 10% of Fall College of Engineering students placed in UM remedial math (negative entry fraction)
• Entry credit and extracurricular activities
  - Predictor of mean performance, levels out at 30 credits
  - Some students with very large values
  - Unexplained correlation
  - Absolutely zero outliers!

Conclusions
Better performance of Engineering 100 blimp students in subsequent courses
• Equivalent to 2–3 AP courses (before entry to UM)
• More significant for students with less entry credit
• More pronounced for Aerospace students.
Most prominent discriminators in performance of all College of Engineering first-year students
• Credit at the time of entry to UM
• Lowest of SAT or ACT scores

Correlation of number of academic credit transferred to UM for CoE students with number of sports, music, and other activities in high school

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