Erik Van Horn, Auburn University

ABSTRACT: To successfully compete in tomorrow's economy, aerospace engineers must be competent, creative, and collaborative. Preparing students for such an environment requires instructors to use effective teaching techniques. The first part of my presentation focuses on my teaching philosophy, which centers around the following core principles: (a) enhancing problem solving skills through the use of open-ended questions and problems; (b) facilitating self-learning experiences that help students to internalize key concepts; (c) fostering active participation by establishing a dynamic learning environment; (d) demonstrating real-world applications to provide motivation and ground students understanding; and (e) developing student teamwork and collaboration skills through group discussions, assignments and projects. In this presentation, I will describe each of these core principles and give examples of how I have implemented these principles in past teaching assignments.

Finally, I will describe some of the lessons I have learned and how I plan to adapt and use them in future courses.

To demonstrate some of these core tenets in action, I will present a lecture on what has been called "one of the most used and abused" equations in fluid mechanics - Bernoulli's equation. While ostensibly derived under seemingly-strict assumptions, Bernoulli's equation has been used to analyze a vast myriad of fluid dynamic problems. However, many undergraduate students treat Bernoulli's equation as the aerodynamic equivalent of a Swiss-army knife, often misusing it for problems for which it is inappropriate. In this teaching demonstration, I will present a development of Bernoulli's equation, highlighting the assumptions inherent in derivation of the equation and stressing the limitations of its use so as to clearly show when use of Bernoulli's equation is appropriate and when it is not.