



THE UNIVERSITY OF
ARIZONA
TUCSON ARIZONA



Aerospace and Mechanical Engineering Seminar

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A Suggestion on How Calculus Should be Presented to Engineers

Calculus is the language of the engineer, regardless of the engineering discipline. It enables the engineer to take a physical problem of interest and visualize it as a set of mathematical rules leading to a solution. The process then proceeds much as the scientific method, by forming a computational framework to derive a numerical expression of solution that is then verified and validated. Generally, analytical (advanced) calculus and numerical methods are taught separately to undergraduates in courses AME 301 and 302, and currently we do not have a numerical component at the graduate level. Since the numerical implementation of calculus is essential to engineering, we explore the possibility of presenting both in a single course. Here, I will present an example lecture on special functions – their analytical origin and numerical evaluation to high order. Important to note is that these two aspects will be presented together. Time permitting, we conclude with an application.

Bio:

Barry D. Ganapol is currently a professor in the department of aerospace and mechanical engineering at the University of Arizona and a research professor in the department of nuclear engineering at the University of Tennessee. He received his PhD from the University of California, Berkeley, in 1971 followed by two years at the Swiss Federal Institute for Reactor Research and one year at the Center for Nuclear Studies at Saclay in France. After three years at Argonne National Laboratory, he joined the department of nuclear engineering faculty at the University of Arizona in 1976. Ganapol has served as chair of the nuclear engineering department and acting and associate chair of the AME department. His research interests include developing analytical and numerical methods to solve the neutron Boltzmann equation in the pursuit of high-quality benchmark solutions. This activity has led to his broader interest of verification and validation strategies applied to modeling and simulation of nuclear systems. In addition to his nuclear interests, Ganapol has investigated the health of vegetation canopies from first principles of radiative transfer with application to satellite remote sensing. During his 45-year career, Barry Ganapol has held appointments at eleven DoE, NASA and military research laboratories and published over 275 articles. In addition, he is a fellow of the American Nuclear Society and recipient of the Gerald C. Pomraning Award from the Mathematics and Computation Division of the American Nuclear Society for his outstanding contributions to transport theory. In 2006, Ganapol received the da Vinci Fellowship for excellence in overall scholarship, teaching and service from the College of Engineering at the University of Arizona.

AME Lecture Hall, Room S212

Thursday, Jan. 19, 2017

4 p.m.

Refreshments and socializing 3:45 p.m. at the east end of the AME Courtyard