: **Active Learning in Applied Mathematics Courses**

:   Robin Pemantle, University of Pennsylvania

Teaching methodology reflects goals. In the last two decades,
non-lecture approaches to the teaching of freshman math
and science have been increasingly common. Presumably this
reflects prioritizing experience in synthesizing and
problem solving over building algorithmic skills. These
methods are less common in advanced mathematics, probably
due to the need for demonstration of rigorous technique
and the perception that advanced students already know
how to engage with mathematics.

This talk concerns Penn's Applied Probability modeling course.
Students come from many different departments and schools.
They have the skills to understand rigorous real analysis,
but prioritize being able to formulate and analyze models
over the technicalities of proofs of classical results.
Similar populations of students exist in large numbers at
research universities, especially among PhD and Masters
programs outside mathematics, for example in economics,
engineering, computer science, biostatistics and genomics.

I will discuss how to deliver a significant portion of
rigorous infrastructure for formal probability (roughly
70% of what we teach in the standard PhD course) while
giving the students time during class to practice
probability modeling, that is, turning verbal scenarios
into rigorous and tractable mathematics. Materials for
the course on which this talk is based are freely available.