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In Spring 2017, California State University Long Beach offered the first iteration of a course in mathematical modeling for pre-service secondary teachers that was co-developed and co-taught by an applied mathematician and a mathematics educator. The development and teaching of the course was approached as a design experiment; data included all course artifacts, instructor reflections, and student surveys. We report on preliminary findings and on emergent hypotheses that will guide the teaching and research of the next iteration of the course in Fall 2018. In particular, we will discuss (1) the role that students' quantitative and covariational reasoning played in shaping the course activity, (2) how early direct instruction about the modeling cycle may have hindered students, and (3) insights about developing pre-service teachers' pedagogical content knowledge of mathematical modeling. (Received September 21, 2017)