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The NSF-funded CATALST project is developing a radically different undergraduate introductory-statistics course that uses randomization and resampling approaches as the only methods for statistical inference. Standard parametric tests of significance, such as the two-sample t-test and Chi-square analyses, are not taught in the course. Instead, a carefully designed sequence of activities based on research in mathematics and statistics education research help students develop their understanding of randomness, chance models, randomization tests and bootstrap coverage intervals. For each unit in this course, students first engage in a Model-Eliciting Activity (MEA; Lesh & Doer, 2003; Zawojewski, Bowman, & Diefes-Dux, 2008) that primes them for learning the statistical content of the unit (Schwartz, 2004). This is followed by activities where the students explore how to model chance and chance models using modeling software such as TinkerPlots and then transitioning to analysis tools built on the R framework to carry out randomization tests and estimate bootstrap coverage intervals. The talk will present activities from the first unit on chance and chance models to illustrate this approach. (Received September 22, 2010)