

## Using Active Learning in a Preparatory Introduction to Mechanics Course

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Based on the hypothesis that students struggle understanding fundamental principles of physics and thus cannot apply math concepts while solving physics problems, a preparatory physics course has been developed and taught at California State University, Los Angeles in both Fall 2017 and Fall 2018 as part of the NSF-funded FYRE@ECST program. The preparatory physics course, titled "Introduction to Mechanics", covers about half of the content of a classical "Physics I: mechanics" course and employs a lot of active-learning methods to help students understand fundamental physics principles.

In addition to in-class active learning, during the Fall/2019, a semi-flipped teaching approach was used to improve learning. Students were required to watch videos related to the class content and complete a pre-class quiz before coming to class. Students' performance in pre-class quiz were utilized by the instructors to design course activities. Students' performance in both Fall 2017 and 2018 were compared and are presented in the poster. In addition, students' performance results in the FCI and physics course for treatment and control groups are compared. Results show that students who took this course performed better in pre- and post-Force Concept Inventory (FCI), learned more during the physics course, as shown by normalized gain, and had a considerably higher passing rate in physics compared to the control group.

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