School of Physical Sciences Seminar

Title: A research-validated approach to transforming upper-division physics courses

Speaker: Prof Steven Pollock, University of Colorado Boulder

Date: Monday 29th April 2024 12:00

Location: GLA-N115 Marconi building

Abstract:

At most universities, upper-division physics courses are taught using a traditional lecture approach that does not make use of many of the instructional techniques that have been found to improve student learning at the introductory level. We are transforming upper-division courses (E&M, quantum, Classical Mechanics and others) using principles of active engagement and learning theory, guided by the results of observations, interviews, and analysis of student work. I will outline these reforms including consensus learning goals, clicker questions, tutorials, modified homeworks, and more, as an example of what a transformed upper-division course can look like, and as a tool to offer insights into student difficulties in advanced undergraduate topics. We have examined the effectiveness of these reforms relative to traditional courses, based on grades, interviews, and attitudinal and conceptual surveys. Our results suggest that it is valuable to consider how physics is taught at the upper-division, and how education research may be supportive in this context.

Materials available at https://www.colorado.edu/per/resources/course-materials

Brief Biography:

Steven Pollock is a professor of Physics at the University of Colorado Boulder. His BSc was from MIT (Physics, 1982). His PhD is in theoretical Nuclear Physics from Stanford University (1988). He is an APS Fellow, a Pew teaching scholar, a CU President's teaching scholar, and the 2013 Carnegie US Professor of the year. His current research is in PER (Physics Education), investigating student learning in physics classes, and the constraints and opportunities involved in replicating "proven" curricular practices, as well as extending educational models to the upper division.