



PER User's Guide

Physics Education Research

Evidence-based resources for teaching physics



CU upper-division E&M curriculum

 Indicates a research-demonstrated benefit

Overview

Supplementary activities for upper-level E&M. All materials are modular and can be mixed and matched with any other teaching strategy or materials.



Type of Method

Full curriculum, Curriculum supplement, Tutorials



Level

Designed for: Upper-level Undergraduate 

Can be adapted for: Intermediate, Graduate School



Setting

Designed for: Lecture - Large (30+ students)  , Lecture - Small (<30 students)

 , Recitation/Discussion Session, Homework

Can be adapted for: Out-of-class tutorials



Coverage

Many topics with less depth, Traditional upper-division E&M I coverage (e.g. first half of Griffiths text)



Topics

Electricity / Magnetism



Instructor Effort

Medium





Resource Needs

TAs / LAs, Clickers / polling method, Projector





Skills


Designed for: Conceptual understanding  , Problem-solving skills  , Using multiple representations, Identifying appropriate method to solve particular problems, Faculty attention to student difficulties.




Can be adapted for: Making real-world connections, Metacognition



Research Validation

Based on research into: theories of how students learn  , student ideas about specific topics 

Demonstrated to improve: conceptual understanding 

Studied using: student interviews  , classroom observations  , research at multiple institutions 



Compatible Methods

[Peer Instruction](#), [PhET](#), [JiTT](#), [CGPS](#), [Physlets](#), [SCALE-UP](#), [OSP](#), [LA Program](#), [CAE TPS](#), [TEFA](#), [Paradigms](#), [Tutorials](#), [Clickers](#)

**Similar
Methods**

[CU Modern](#), [CU QM](#), [Paradigms](#)

**Developer(s)**

Steven Pollock, Stephanie Chasteen, and many others in the CU PER group and the CU Physics department

**Website**

http://www.colorado.edu/sei/departments/physics_3310.htm

Teaching materials

You can download all course materials, including lecture slides, clicker questions, homework, exams, and solutions from the developer's website (you'll need to ask for a password to access solutions):

E&M I: http://www.colorado.edu/sei/departments/physics_3310.htm

E&M II: http://www.colorado.edu/sei/departments/physics_3320.htm

