



## CU Modern Physics Curriculum

Indicates a research-demonstrated benefit

### Overview

Curriculum for large-lecture modern physics class for engineering majors. Focus on reasoning development, model building, and real-world applications.



#### Type of Method

Full curriculum, Curriculum supplement, Tutorials, Computer simulations



#### Level

**Designed for:** Intermediate

**Can be adapted for:** Teacher Prep Course, Teacher Professional Development, High School, Intro College Calculus-based, Intro College Algebra-based, Intro College Conceptual, Upper-level Undergraduate, Graduate School



#### Setting

**Designed for:** Lecture - Large (30+ students) , Homework

**Can be adapted for:** Lecture - Small (<30 students), Recitation/Discussion Session, Lab, Studio



#### Coverage

Many topics with less depth



#### Topics

Modern / Quantum



#### Instructor Effort

Medium



#### Resource Needs

Projector, Computers for students



#### Skills

**Designed for:** Conceptual understanding , Making real-world connections

, Problem-solving skills, Using multiple representations

**Can be adapted for:** Lab skills, Metacognition









#### Research Validation

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

**Demonstrated to improve:** conceptual understanding , beliefs and attitudes

**Studied using:** student interviews , classroom observations , analysis of written work , peer-reviewed publication

 <b>Compatible Methods</b>	<a href="#">Peer Instruction</a> , <a href="#">PhET</a> , <a href="#">JiTT</a> , <a href="#">CGPS</a> , <a href="#">Physlets</a> , <a href="#">SCALE-UP</a> , <a href="#">OSP</a> , <a href="#">Thinking Problems</a> , <a href="#">LA Program</a> , <a href="#">CAE TPS</a> , <a href="#">New Model Course</a> , <a href="#">CPU</a> , <a href="#">TEFA</a> , <a href="#">CU QM</a> , <a href="#">QuILTs</a> , <a href="#">Paradigms</a> , <a href="#">PI QM</a> , <a href="#">Tutorials</a> , <a href="#">Clickers</a>
 <b>Similar Methods</b>	<a href="#">New Model Course</a> , <a href="#">CU E&amp;M</a> , <a href="#">CU QM</a>
 <b>Developer(s)</b>	Carl Wieman, Kathy Perkins, Sam McKagan
 <b>Website</b>	<a href="http://per.colorado.edu/modern">http://per.colorado.edu/modern</a>
 <b>Intro Article</b>	5247
 <b>Intro Article</b>	<a href="#">Reforming a large lecture modern physics course for engineering majors using a PER-based design</a>

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## **Teaching materials**

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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): <http://per.colorado.edu/modern>