




# PER User's Guide

Physics Education Research

Evidence-based resources for teaching physics



## Workshop Physics

 Indicates a research-demonstrated benefit

### Overview

A calculus-based introductory physics curriculum designed to completely replace traditional lectures and laboratories with sequenced activities.




#### Type of Method

Full curriculum, Classroom structure



#### Level

**Designed for:** Intro College Calculus-based 

**Can be adapted for:** High School , Intro College Algebra-based, ([Explorations in Physics](#) uses the Workshop Physics style of guided inquiry but it designed for use in non science major classes)



#### Setting

**Designed for:** Studio 

**Can be adapted for:** Lecture - Small (<30 students) , Lab 



#### Coverage

Many topics with less depth, The topic coverage has been reduced by about 15% so it is between broad and deep.



#### Topics

Mechanics, Electricity / Magnetism, Waves / Optics, Thermal / Statistical, Modern / Quantum



#### Instructor Effort

Medium







#### Resource Needs

TAs / LAs, Projector, Computers for students, Advanced lab equipment, Cost for students, Tables for group work





#### Skills





**Designed for:** Conceptual understanding , Lab skills , Using multiple representations , Designing experiments , collaborative skills

**Can be adapted for:** Problem-solving skills, Metacognition



#### Research Validation

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

**Demonstrated to improve:** conceptual understanding , lab skills , beliefs and attitudes , retention of students 

**Studied using:** student interviews , research at multiple institutions 



#### Compatible Methods

[PhET](#), [JiTT](#), [ILDs](#), [Physlets](#), [RealTime Physics](#), [SCALE-UP](#), [OSP](#), [LA Program](#), [MBL](#), [CPU](#), [Responsive Teaching](#)



**Similar  
Methods**

[ILDs](#), [RealTime Physics](#), [SCALE-UP](#), [MBL](#), [EiP](#)



**Developer(s)**

Priscilla Laws with contributions from Robert Boyle, Patrick Cooney, Kenneth Laws, John Luetzelschwab, David Sokoloff and Ronald Thornton



**Website**

[http://physics.dickinson.edu/~wp\\_web/wp\\_homepage.html](http://physics.dickinson.edu/~wp_web/wp_homepage.html)

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## **Teaching materials**

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Realtime Physics is available in a series of books published by Wiley:

- [Module 1](#): The Core Volume: Mechanics I: Kinematics and Newtonian Dynamics (Units 1-7)
- [Module 2](#): Mechanics II: Momentum, Energy, Rotational and Harmonic Motion, and Chaos (Units 8 - 15)
- [Module 3](#): Heat Temperature and Nuclear Radiation: Thermodynamics, Kinetic Theory, Heat Engines, Nuclear Decay, and Random Monitoring (Units 16 - 18 and 28)
- [Module 4](#): Electricity and Magnetism (Units 19-27)