Physics Union Mathematics

Indicates a research-demonstrated benefit

Overview

PUM is a physics/physical science curriculum that strongly links middle and high school physics curricula and builds on the intrinsic mathematical reasoning to develop and strengthen students' mathematical concepts at the pre-algebra, algebra and algebra 2 levels. PUM curriculum consists of logically connected modules that allow students to build their conceptual understanding of physics concepts, develop relevant mathematical reasoning and simultaneously learn how to think like scientists.

Type of Method	Full curriculum, Curriculum supplement
Level	**Designed for:** High School , Middle School **Can be adapted for:** Teacher Preparation, Teacher Professional Development, Intro College Calculus-based, Intro College Algebra-based, Intro College Conceptual
Setting	**Designed for:** Lecture - Small (<30 students) , Recitation/Discussion Session, Lab, Homework
Coverage	Few topics with great depth
Topics	Mechanics, Electricity / Magnetism
Instructor Effort	High
Resource Needs	Projector in class, Computers for student use in class, Computers for student use outside of class, Lab equipment for student use - professional, Tables arranged for group work
Skills	**Designed for:** Problem-solving skills, Conceptual understanding of physics content, Connecting conceptual and mathematical understanding, Think like a scientist, Reflecting on one's own learning, Laboratory skills, Representing knowledge in multiple ways, Designing experiments, Creativity **Can be adapted for:** Coherent framework for physics, Understanding how physics relates to the real world, Self-confidence around physics, Enjoyment of physics, Autonomy

Research Validation	**Based on research into:** how students learn , student ideas about specific topics **Demonstrated to improve:** scores on multiple choice conceptual tests , scores on written conceptual tests , laboratory skills **Studied using:** conceptual pre/post exams , problem-solving pre/post exams , classroom observations , video of students
Compatible Methods	JiTT, Physlets, SCALE-UP, Modeling, OSP, ISLE, CPU
Similar Methods	ISLE
Developer(s)	Eugenia Etkina, Suzanne Brahmia, Chis D'Amato, James Finley, Jim Flakker, Danielle Bugge, Richard Therkorn
Website	http://pum.rutgers.edu
Intro Article	10390
Intro Article	Searching for Evidence of Student Understanding